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FITTING OUT AND ADMINISTRATION
OF A
NAVAL HOSPITAL SHIP

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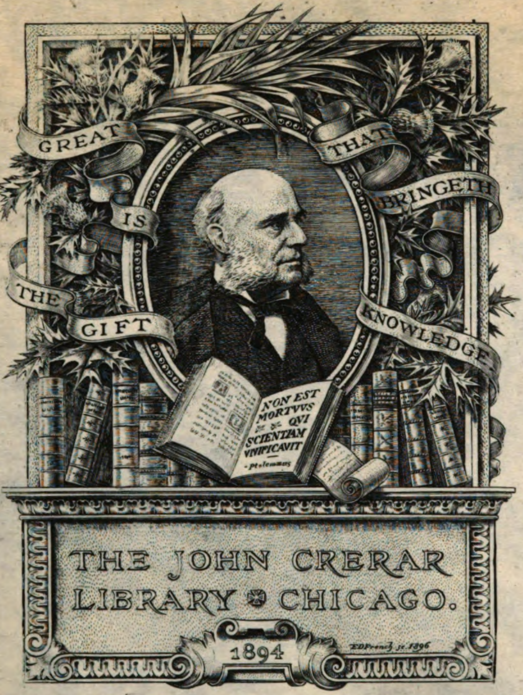
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THE
FITTING OUT AND ADMINISTRATION OF A NAVAL HOSPITAL SHIP

THE
FITTING OUT AND ADMINISTRATION
OF A
NAVAL HOSPITAL SHIP

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By EDWARD SUTTON,
Fleet Surgeon, R.N.
S.M.O., R.N. Hospital Ship 'Plassy'; Late S.M.O., R.N. Hospital Ship 'Drina';
Late Surgeon, R.N. Hospital Ship 'Malacca.'

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PREFACE

For the conversion of a vessel of the Mercantile Marine into a hospital ship, the Medical Department of the Royal Navy provide admirable specifications for the accommodation required, and also for the accessories. The organization, or working of the ship, however, is left almost entirely to the discretion and ingenuity of the medical officer in charge, which offers him a wide scope.

To maintain complete supervision of the details of administration occupies my full time; this has completely debarred me from participating in clinical work.

With the hope that the results of the past three and a quarter years' experience will prove of use to those interested, I have ventured to record on paper a description of the conversion of the S.S. *Drina*, and also the full details of the administration of a hospital ship. The detail of administration was evolved in, first, the *Drina*, and later the *Plassy*, which therefore accounts for the names of both hospital ships constantly appearing in the text.

Section I gives a historical account of hospital ships, of the Geneva Convention, and the international law relating to these ships.

Section II deals in full detail with the description of all wards, rooms, and fittings in the *Drina*. Full measurements have been given as a guide to a novice who is suddenly called upon to fit out a hospital ship.

Sections III and *IV* give an account of the details of organization.

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The fact must be emphasized that, in the section dealing with construction, the hastily improvised hospital ship is alone referred to, unlike the sections on organization, which apply equally to ships originally constructed for the purpose. With these improvised hospital ships the first essential is the utmost rapidity in reconstruction compatible with efficiency, and consequently refinements, such as noiseless, easy-running electric lifts, and boat or cot hoists, are in many cases out of the question.

E. S.

December, 1917.

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ON THE

FITTING OUT AND ADMINISTRATION OF A NAVAL HOSPITAL SHIP.

SECTION I.

HOSPITAL SHIPS—GENERAL CONSIDERATIONS.

CHAPTER I.

THE EVOLUTION OF THE HOSPITAL SHIP.

The Sailing Ship Era.—In a report quoted by Pickthorn,[1] the French claim to have been the first to utilize, towards the end of the seventeenth century, sea-going ships for hospital purposes; but our own records[2] show that so-called hospital ships were attached to British squadrons about the same time or even earlier. This French report recommended one vessel entirely devoted to the sick, with high decks and large ports, and freed of her guns, for every ten ships of the line. Furthermore, there were specified the details of a medical and administrative staff and of a complete medical and surgical equipment. Whether or no these recommendations were carried out in full, a trial of the principle seems to have been made at the battle of Beachy Head in 1690; but the difficulties in transhipment, inherent in sail power, rendered it a comparative failure.

British naval records of the eighteenth century frequently allude to similar craft, and although these references not infrequently apply to isolation hulks, there is also evidence that the vessels were sometimes sea-going.

Nevertheless, even where the essentials, as specified in the French report, were actually provided, it is safe to conclude that the inevitable handicap of then existing conditions would seriously interfere with the arrangements for the comfort and proper treatment of the patients. For instance, these old-time ships would have to depend for motive power upon sails, with their accompaniment of noise and their lack of reliability. Of the other initial disadvantages, perhaps the most marked were the crude methods then in use for food preservation, and the state of the fresh water, perforce stored in casks prior to the introduction of iron tanks about the year 1815, and which, as graphically described in the Navy Health Report, 1831–6, rapidly became green and foul.

The Development of the Modern Hospital Ship.—During the period succeeding the Napoleonic wars, up to and including the Crimean campaign,[3] there is little evidence of the use of hospital ships, either naval or military. But shortly after, for the China operations of 1860,[4] two iron steamships were equipped for the purpose at home, and wooden transports were similarly fitted out on the spot. These were among the earliest of modern hospital ships to attend an army on active service, and in commenting on "their unspeakable advantages," Inspector-General Muir presumed "that in a future war such vessels would be considered part of the necessary equipment."

In these pioneers the patients were accommodated in berths, mostly in two tiers, and were allowed a cubic space of about 230 feet per head, while ventilation was natural, aided by exhaust pipes to the galley, and artificial warming depended upon the boiler-rooms and stoves. The drinking water was now derived from condensation, and an equivalent of the modern laundry, in the shape of a wash-house on the upper deck, with a trough and drying-room, was provided. There was a surgery and dispensary combined, into which patients for operation could be lowered through a skylight.

The great European and American wars of about the same period were mainly continental in character, and sea-going hospitals were little required, although there appears to have been a floating hospital in the Mississippi in 1865.[5] Consequently the Ashanti expedition of 1873[6] affords the next landmark in their history, and for this, mainly for climatic reasons, the *Victor Emanuel* and *Simoom* were fitted out to serve as base hospitals. Both were men-of-war, and, in addition to the disadvantages of being primarily adapted for fighting purposes rather than for comfort, retained their naval crews and naval commanding officer, arrangements totally at variance with the provisions of the present-day Hague Convention. The *Victor Emanuel*, which was one of the later examples of the old-type wooden steamship, illustrates the relative advantages and disadvantages of this kind of vessel for hospital purposes. For instance, her 7-foot bulwarks and well deck interfered with ventilation, and her organic structure gave rise to foul-smelling bilge, both these features being much complained of. On the other hand, ventilation was assisted by her large ports and the freedom from obstructions on the decks used for hospital purposes, while the poor conduction of her wooden sides made for equability of temperature. Her main deck constituted a general ward with a cubic space per head of 330 ft. As it likewise contained the combined surgery and dispensary, and no less than twenty-two poorly ventilated w.c.'s, the arrangement cannot be regarded as ideal. Innovations were to be found in the shape of a steam laundry and an ice machine, but ventilation was entirely natural, candles were the source of artificial illumination, and the clanking noisy Downton's hand-pumps were still in use.

Twelve years later, in 1885,[7] the *Ganges*, a new steel P. & O. steamer, was fitted out for the second Suakin expedition, and represented a distinct advance, both in construction and equipment. The principle of separate wards was adopted, three being fitted out on the main and lower decks, and there was also special accommodation for mental cases, and a lounge for convalescents on the roof of the hurricane deck with which she was provided. The height between decks was 7¾ ft., and the cubic space had increased to 420 ft. per head, the sanitary accommodation being now restricted to the fore part of the ward. Steam propulsion fans and steam-jet extractors were provided for the lower deck, which had only small scuttles. The more important of the other improvements were a cold-air machine, giving facilities for cold storage, and thus obviating the necessity for the carriage of live stock, and a well-equipped operating room with a distinct and separate dispensary.

The senior medical officer was now in charge, and nursing sisters formed part of the staff. Ten years subsequently[8] one of the first of the purely naval hospital ships of modern type was fitted out by Japan for the war with China in 1894–5, and constantly followed the track of the Japanese squadron. This vessel displayed a notable advance in equipment, being provided with a disinfection room, operating room, laboratory, etc.; but she evidently suffered from the defect of trying to cram too much into too small a ship.

About the same time two P. & O. steamers, the *Coromandel*

(1895) and *Malacca* (1897), were somewhat hurriedly equipped by ourselves for West African expeditions. The latter deserves mention inasmuch as she was the first British *naval* hospital ship of modern type, and, moreover, the first to carry a staff of female nurses. Electric lighting, by that time the common method in ships, was the chief improvement to be noted in her.

Towards the close of the nineteenth and beginning of the present century (1898–1905) a series of extensive warlike operations occurred, and as they involved one or both combatants in overseas expeditions, they demanded large numbers of hospital ships. Such were the Spanish-American war, the South African war, the Boxer troubles, and finally the Russo-Japanese war,[9] which rapidly followed one another.

A general resemblance is shown among the craft engaged during this period, and it is unnecessary to do more than indicate the type. There had definitely arrived the era of separate wards, with partitioned-off sanitary annexes, of well-equipped operating rooms with sterilizers, of steam- or electrically-driven laundries, of *x*-ray rooms and laboratories, of steam or electric heating, and frequently of electrically-driven propulsion or exhaust fans for the lower wards. The provision of disinfecting plant, and other than improvised isolation accommodation, was less general, more particularly among the British ships. The amount of cubic space allowed varied ; but in this case the advantage rested with our own rather than the foreign ships.

For the Spanish war, 1898–9, the United States Government and Red Cross Association admirably fitted out six ships, the excellence of the disinfecting plant being a special feature ; but some, such as the *Bay State*,[10] suffered from the common fault of attempting too much on too small a displacement. The *Relief*,[11] which was originally provided by the Army authorities, was again called upon in 1907 to accompany the United States fleet in its voyage round the world. For six months she did excellent service, but then developed structural defects and was replaced by the *Solace*, which had been the Navy Department ship during the war. After refit this vessel followed the example of our own *Maine*, and became permanently attached to the fleet. At this time[12] her principal peculiarities were a cold-storage dead vault (an embalmer being part of the complement), and separate tubercle and venereal wards. Raison[13] criticizes her poor coaling facilities and speed, and her bad sea-going qualities, characteristics which illustrate some of the disadvantages of an adapted vessel.

For the 3116 officers and 72,314 men invalided during the South African war (1899–01)[14] four ships were fitted out at home and six in South Africa, and the latter, from their greater size and relatively smaller draught, proved in every way more suitable. This exemplifies the value of selecting ships, if available, which have been constructed to traverse waters in which operations are taking place. The cubic space allowed averaged 500 feet in acute wards, although it varied from about 200 in the convalescent accommodation to 630 in the zymotic ward of the Red Cross Society's ship *Princess of Wales.* The artificial ventilation system of this last vessel was worthy of note: it consisted of exhaust fans fitted in the sanitary annexe of the upper series of wards, and propulsion fans leading into the lower wards themselves.

Another vessel, the *Maine*, to which reference has already been made, was originally equipped by the American ladies in London, led by Lady Randolph Churchill, for service in South Africa, and after some months was transferred to China[15] to render services to all nationalities during the Boxer troubles. At the end of fifteen months' commission she was presented to the Admiralty for service with the fleet, by the chairman of the Atlantic Transport Company, her owners, and thus became a permanent unit of the latter considerably prior to the utilization of the *Solace* in a like capacity for the United States Navy. For some years she worked chiefly in the Mediterranean, either as a floating hospital or for the transport of naval and military invalids, and was then transferred to the Home Fleet, where she continued her valuable work until the termination of her career by total loss off the coast of Scotland in June, 1914. During her period of usefulness this first hospital ship to be attached to a modern British fleet has served the two-fold purpose of providing the immeasurable benefits of a well-equipped hospital, and of educating not only medical but naval opinion generally in the advantages conferred by the possession of such a vessel and the uses to which she may be put.

For the Russian war[16] Japan provided a large number of hospital ships, both naval and military, and a Russian naval ship was attached to the Port Arthur squadron. As in the preceding war, the Japanese vessels were admirably equipped, and provided with a large trained hospital staff, which included twenty female nurses; but from their small size the wards in many instances were too crowded to permit of adequate nursing of helpless cases, and were not too well ventilated. In fact, according to Colonel Macpherson, they were really hospital 'carriers,' although equal to the best fitted out in any country as regards surgical equipment and personnel.

The Chief Factors which have determined the Direction of Development.—From the foregoing sketch it is obvious that one very definite factor in development has been, naturally, the advance in medical science. Perhaps the greatest influence has been exerted by the germ theory of disease, inasmuch as it has, on the one hand, caused an insistence on surgical cleanliness and all that this implies, and, on the other, emphasized the necessity for cubic space, free air-supply, and sunlight in the treatment of wounds and diseases. Perhaps, however, the most important factor has been the utilization of various discoveries in physics for raising the standard of safety and comfort of those who go down to the sea in ships and do business in the great waters. The substitution of metal for wood; the introduction of steam, and its successive applications to motive power, fresh water-supply, pumping, heating, and disinfection; the increasing appreciation of the advantages of electrical power for lighting, ventilation, heating, and laundry; and, finally, the cold-storage system for food, have all played a notable part in this development. The full possibilities of the increase in comfort produced by various devices for lessening movement and vibration and for promoting equability of temperature in the living parts, and the utilization of electricity as the motive power for lifts and derricks, thereby lessening noise and the production of 'wild heat,'* have hitherto perhaps been less thoroughly exploited.

Some of the Directions in which the Development of the Hospital Ship is likely to Proceed in the Future.—The one outstanding advantage of a ship originally designed for hospital purposes is that it would be possible so to arrange the details of construction as to economize space in the highest degree and at the same time to ensure that every section occupies the most convenient and appropriate position. Of its superiority no doubt can be entertained, and the United States Navy Department has included a hospital ship in the estimates recently presented to Congress. Owing to enforced economy and the success of improvised vessels, it is nevertheless doubtful whether any European nation will contemplate such a departure for many years. In that case the middle course, said to have been already adopted by the Japanese, of designing certain mercantile craft with a view to conversion if required, may become worthy of consideration. Such a plan obviously necessitates restriction to certain trade or passenger routes in order that they may be at hand on emergency.

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* 'Wild' or uncontrolled heat is a term introduced by Gatewood to denote the heat given off in ships by main and auxiliary engines, steam pipes, etc., which produces unequal and irregular heating in the living parts.

Whatever the type of vessel, medical requirements will demand for the hospital accommodation as compact and unbroken a space as possible, situated in the central part of the ship where movement is least felt and the sea least troublesome in bad weather, and extending, with the promenade decks bordering it, throughout her whole width. Maximum freedom from vibration and the steadiest platform possible will also be essential.

The best methods of obtaining these advantages, whether by shape of hull, bilge keels, low-set propellers, engines right aft, etc., and the relative merits for the purpose of carefully-balanced reciprocating engines, turbines, and oil engines, are constructive and engineering problems which need not be discussed here. It may be said, however, that high speed, inasmuch as it implies greater cost, absorption of space and production of heat, larger crews, and increase of discomfort in bad weather, is undesirable, and war experience has shown it to be unnecessary. A cruising speed of ten or twelve knots, with an extra three or four for emergencies, is probably all that is required.

For fuel, oil suggests itself from the ease of its replenishment, and its cleanliness, and the new American hospital ship is to be an oil-burner.[17]

Other possibilities for improvement relate to the provision of thorough insulation by non-conducting devices, not only of any sources of 'wild heat' which are in unavoidable proximity to hospital parts, but also of the external walls of the latter. For *regulating* the temperature, the use of steam or electric radiators, or the preferable alternative of warming the incoming air, will be available.

The principle of separate wards will probably be extended as far as compatible with administrative control and nursing efficiency, and will at least include a separate deck ward for tubercle cases, with facilities for modern treatment. It may be taken for granted that wards will have easy approaches, lifts for food, etc., as well as for patients, smooth decks, and walls with rounded corners, and that such irregularities as electric leads will be protected from cockroaches and other vermin, and also, incidentally, from the risk of producing fire.

Extension of wards throughout the entire width, and the presence of promenade decks, will facilitate natural ventilation in bad weather; but this will almost certainly be supplemented by propulsion and exhaust fans, and probably by air heaters. A point to be emphasized is the advisability of securing, as in the *Princess of Wales*, negative pressure in sanitary annexes and positive in the wards, while the system for isolation wards must of course be absolutely separate.

In providing such fittings as lifts, cranes, ventilating fans, etc., the ideals at which to aim are noiselessness, ease of working, and absence of liability to get out of order, and the use of electrical gear perhaps best meets these requirements.

With regard to the details of equipment, the ship will, as at present, be equal to the majority of hospitals ashore, and will probably include the thoroughly equipped bacteriological and serological laboratories with accommodation for animals which are to be provided in the new American vessel,[18] and perhaps even such refinements as the sun-rooms, medico-mechanical equipment, and room for medical baths suggested by Dr. zur Verth.[19]

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CHAPTER II.

THE GENEVA CONVENTION:

USES AND ABUSES OF A HOSPITAL SHIP IN WAR TIME.

The Geneva Convention.—The question of the care of the sick and wounded dates back to the earliest times; but it was not until after the middle of the nineteenth century that Henri Dunant laid the foundation of the great Red Cross organization. Before this, in the eighteenth century, countries had realized that it was incumbent upon them to look after their sick and wounded soldiers and sailors, as shown in the Austrian War of Succession, when a treaty was concluded to exempt hospitals from attack. In the Crimean war, however, and later in the Italian campaign of 1859, the medical services were very defective, and it was the pitiable state of affairs in this latter campaign, especially in the battle of Solferino, which attracted the attention of the whole world, and led to an international recognition of the inviolability of the sick and wounded. Philanthropists set to work to improve matters, and prominent amongst these were such men as Henri Arrault in France, and Dr. Palasciano in Italy; but the name of the real pioneer, Henri Dunant, will be handed down to history as one of the greatest benefactors in the cause of succour for the sick and wounded who ever lived.

Henri Dunant, a Swiss, was born at Geneva on May 8, 1828. Inspired by the magnificent work performed by Florence Nightingale in the Crimean war, he gave himself up to do all in his power for the sick and wounded at the battle of Solferino. In 1862 he wrote his celebrated brochure, *A Souvenir of Solferino.* This book attracted the attention of the whole world, and led up to an International Conference held informally at Geneva in 1863. The Conference resulted in the Geneva Convention, containing ten Articles, being drawn up and concluded on August 22, 1864. The Convention was signed at first by twelve European countries, but to-day it binds forty-seven Powers.

The signing of this Convention was at least an official recognition of the inviolability of the wounded and the personnel and material of the medical services; but it only applied to land fighting, and did not include maritime warfare. Two years later, the battle of Lissa between the Austrian and Italian fleets made it evident that an extension of the Convention was necessary for maritime warfare in order to make provision for the latter. A movement was set on foot, and on October 20, 1868, a scheme of additional Articles dealing with maritime warfare was made out. These Articles were not then ratified. At the Hague Conference in 1899 the question was again gone into, and on July 29 of that year they were signed and ratified by all the representative powers.

Later, when it became evident that a revision of the original ten Articles was necessary, the question was discussed, the Swiss Federal Government taking the initiative, and at a Conference at Geneva in June, 1906, a new Geneva Convention was drawn up, consisting of thirty-three Articles, a certain number of which were signed by all the representatives on the spot, and some also have been ratified by their respective governments at home.

Following on the revision of the original ten Articles of the Geneva Convention, a second Peace Conference was held at the Hague in order to revise that part which related to naval warfare. This new Convention for the adaptation to maritime warfare of the principles of the Geneva Convention of August 22, 1864, was completed on October 17, 1907, and was signed on the spot by thirty-two States.

In summarizing this story of the Red Cross, it is thus seen that four Conventions have been signed and partly ratified, two at Geneva for land war (1864 and 1906), and two at the Hague for naval war (1899 and 1907).

The Rules Governing the Employment of the Hospital Ship.—These are laid down in the Articles of the Geneva Convention as amended by the Hague Conference of October 17, 1907. The following is a translation (Parliamentary Blue Book, Miscellaneous, No. 1, 1908):—

CONVENTION FOR THE ADAPTATION TO MARITIME WARFARE OF THE PRINCIPLES OF THE GENEVA CONVENTION OF AUGUST 22, 1864.

Article I.—Military hospital ships, that is to say, ships constructed or assigned by States specially and solely with a view to assisting the wounded, sick, and shipwrecked, the names of which have been communicated to the belligerent Powers at the commencement or during the course of hostilities, and in any case before they are employed, shall be respected, and cannot be captured while hostilities last.

These ships, moreover, are not on the same footing as war ships as regards their stay in a neutral port.

Article II.—Hospital ships, equipped wholly or in part at the expense of private individuals or officially recognized relief societies, shall likewise be respected and exempt from capture, if the belligerent power to whom they belong has given them an official commission and has notified their names to the hostile Power at the commencement of or during hostilities, and in any case before they are employed.

These ships must be private, with a certificate from the competent authorities, declaring that the vessels have been under their control while fitting out and on final departure.

Article III.—Hospital ships, equipped wholly or in part at the expense of private individuals or officially recognized societies of neutral countries, shall be respected and exempt from capture, on condition that they are placed under the control of one of the belligerents, with the previous consent of their own Government and with the authorization of the belligerent himself, and that the latter has notified their name to his adversary at the commencement of or during hostilities, and in any case before they are employed.

Article IV.—The ships mentioned in *Articles I*, *II*, and *III* shall afford relief and assistance to the wounded, sick, and shipwrecked of the belligerents without distinction of nationality.

The Governments engage not to use these ships for any military purpose.

These vessels must in no wise hamper the movements of the combatants.

During and after an engagement they will act at their own risk and peril.

The belligerents shall have the right to control and search them ; they can refuse to help them, order them off, make them take a certain course, and put a commissioner on board ; they can even detain them, if important circumstances require it.

As far as possible the belligerents shall enter in the log of the hospital ships the orders which they give them.

Article V.—Military hospital ships shall be distinguished by being painted white outside, with a horizontal band of green about a metre and a half in breadth.

The ships mentioned in *Articles II* and *III* shall be distinguished by being painted white outside, with a horizontal band of red about a metre and a half in breadth.

The boats of the ships above mentioned, as also small craft which may be used for hospital work, shall be distinguished by similar painting.

All hospital ships shall make themselves known by hoisting, with their national flag, the white flag with a red cross provided by the Geneva Convention, and further, if they belong to a neutral State, by flying at the mainmast the national flag of the belligerent under whose control they are placed.

Hospital ships which, in the terms of *Article IV*, are detained by the enemy, must haul down the national flag of the belligerent to whom they belong.

The ships and boats above mentioned which wish to ensure by night the freedom of interference to which they are entitled, must, subject to the assent of the belligerent they are accompanying, take the necessary measures to render their special painting sufficiently plain.

Article VI.—The distinguishing signs referred to in *Article V* can only be used, whether in time of peace or war, for protecting or indicating the ships therein mentioned.

Article VII.—In the case of a fight on board a warship, the sick wards shall be respected and spared as far as possible.

The said sick wards and the matériel belonging to them remain subject to the laws of war ; they cannot, however, be used for any purpose other than that for which they are originally intended, so long as they are required for the sick and wounded.

The commander, however, into whose power they have fallen may apply them to other purposes, if the military situation requires it, after seeing that the sick and wounded on board are properly provided for.

Article VIII.—Hospital ships and sick wards of vessels are no longer entitled to protection if they are employed for the purpose of injuring the enemy.

The fact of the staff on the said ships and sick wards being armed for maintaining order and defending the sick and wounded, and the presence of wireless telegraphy apparatus on board, is not a sufficient reason for withdrawing protection.

Article IX.—Belligerents may appeal to the charity of the commanders of neutral merchant ships, and yachts, or boats, to take on board and tend to sick and wounded.

Vessels responding to the appeal, and also vessels which have of their own accord rescued sick, wounded, or shipwrecked men, shall enjoy special protection and certain immunities. In no case can they be captured for having such persons on board, but, apart from special undertakings that have been made to them, they remain liable to capture for any violation of neutrality they may have committed.

Article X.—The religious, medical, and hospital staff of the captured ship is inviolable, and its members cannot be made prisoners of war. On leaving the ship they take away with them the objects and surgical instruments which are their own private property.

This staff shall continue to discharge its duties while necessary, and afterwards leave, when the Commander-in-Chief considers it possible.

The belligerents must guarantee to the said staff when it has fallen into their hands the same allowances and pay which are given to the staff of corresponding rank in their own navy.

Article XI.—Sailors and soldiers on board, when sick or wounded, as well as other persons officially attached to fleets or armies, whatever their nationality, shall be respected and tended by the captors.

Article XII.—Any warship belonging to a belligerent may demand that sick, wounded, or shipwrecked men on board military hospital ships, hospital ships belonging to relief societies or to private individuals, merchant ships, yachts, or boats, whatever the nationality of these vessels, should be handed over.

Article XIII.—If sick, wounded, or shipwrecked persons are taken on board a neutral warship, every possible precaution must be taken that they do not again take part in the operations of the war.

Article XIV.—The shipwrecked, wounded, or sick of one of the belligerents who fall into the power of the other belligerent are prisoners of war. The captor must decide, according to circumstances, whether to keep them, send them to a port of his own country, to a neutral port, or even to an enemy port. In this last case, prisoners thus repatriated cannot serve again while the war lasts.

Article XV.—The shipwrecked, sick, or wounded who are landed at a neutral port with the consent of the local authorities must, unless an agreement is made to the contrary between the neutral State and the belligerent States, be guarded by the neutral State so as to prevent them again taking part in the operations of the war.

The expenses of tending them in hospital and interning them shall be borne by the State to which the shipwrecked, sick, or wounded persons belong.

Article XVI.—After every engagement the two belligerents, so far as military interests permit, shall take steps to look for the shipwrecked, sick, and wounded, and to protect them, as well as the dead, against pillage and ill-treatment.

They shall see that the burial, whether by land or sea, or cremation of the dead, shall be preceded by a careful examination of the corpse.

Article XVII.—Each belligerent shall send, as early as possible, to the authorities of their country, navy, or army the military marks or documents of identity found on the dead and the description of the sick and wounded picked up by him.

The belligerents shall keep each other informed as to interments and transfers, as well as to the admissions into hospital, and deaths which have occurred among the sick and wounded in their hands. They shall collect all the objects of personal use, valuables, letters, etc., which are found in captured ships, or which have been left by the sick or wounded who die in hospital, in order to have them forwarded to the persons concerned by the authorities of their own country.

Article XVIII.—The provisions of the present Convention do not apply except between contracting powers, and then only if all the belligerents are parties to the Convention.

Article XIX.—The Commanders-in-Chief of the belligerent fleets must see that the above articles are properly carried out; they will have also to see to cases not covered thereby, in accordance with the instructions of their respective Governments and in conformity with the general principles of the present Convention.

Article XX.—The signatory Powers shall take the necessary measures for bringing the provisions of the present Convention to the knowledge of their naval forces, and especially of the members entitled thereunder to immunity, and for making them known to the public.

Article XXI.—The signatory Powers likewise undertake to enact or to propose to their Legislatures, if their criminal laws are inadequate, the measures necessary for checking in time of war individual acts of pillage and ill-treatment in respect to the sick and wounded in the fleet, as well as for punishing, as an unjustifiable adoption of naval or military marks, the unauthorized use of the distinctive marks mentioned in *Article V* by vessels not protected by the present Convention.

They will communicate with each other, through the Netherlands Government, the enactments for preventing such acts at the latest within five years of the ratification of the present Convention.

Article XXII.—In the case of operations of the war between the land and sea forces of belligerents, the provisions of the present Convention do not apply except between the forces actually on board ship.

Article XXIII.—The present Convention, duly ratified, shall replace as between contracting Powers the Convention of July 29, 1899, for the adaptation to marine warfare of the principles of the Geneva Convention.

The Convention of 1899 remains in force as between the Powers which signed it, but which do not also ratify the present Convention.

Summary of the more important Functions of the Hospital Ship and its Relation to the Fleet in War Time.—

1. In war time the hospital ship can, in virtue of her motility, place the services of what amounts to a base hospital at the disposal of a fleet, even when the latter is on detached service hundreds of miles from the nearest permanent establishment of the sort.

These services include, in addition to the ordinary medical and surgical work, the use of equipment for disinfection of bedding and personal effects, and of a laboratory where the diagnosis of such diseases as cerebrospinal meningitis, typhoid, and diphtheria can be made or confirmed. The dental care of the fleet, a department that has, in practice, yielded a very important amount of work, can also be undertaken. Finally, the mortuary is available in cases of sudden death or of deaths in which an autopsy is necessary or desirable.

2. During the period preceding actual hostilities, the fighting units can be freed from sick and injured, and the latter conveyed to permanent hospitals. In this way not only is the efficiency of the fleet increased, but the safety and comfort of the sick are promoted.

Where hospital 'carriers' are likewise available, these can rid the fleet of inefficients and leave the more serious cases to be dealt with by the hospital ship.

3. During active hostilities the hospital ship remains within wireless touch of the fleet, ready to receive the wounded after action.

Possible Abuses: The Question of Confiscation.—For the ideal employment of hospital ships the observance of complete neutrality is necessary, and this one sentence sums up the whole matter. Such acts, for instance, as supplying coal or stores to roving destroyers, or observation and signalling of hostile movements, would come under the definition in *Article VIII* of employment for the purpose of injuring the enemy, and would entail the withdrawal of protection. But perhaps under present circumstances one of the most debatable points is whether a hospital ship renders herself liable to condemnation in the Prize Court by being employed for the carriage of crews and passengers, in good health, taken from enemy or neutral merchant ships destroyed by a belligerent. The question is discussed by Professor A. Pearce Higgins, LL.D., in his work, *War and the*

Private Citizen, pp. 73–90, and in the *Law Quarterly Review*, 1910, vol. xxvi, pp. 408–14 :—

> If the passengers and crews of a destroyed ship are transferred to a warship, the commander will do his best to get rid of them at the earliest opportunity, either by landing them at a port of his own or of a neutral State, or by transferring them to a merchant ship of his own or of a neutral flag. Apart from the dictates of humanity, the naval commander will naturally seize the first opportunity of placing out of harm's way the men, women, and children who are consuming his provisions and hampering the working of his vessel. If he meets a hospital ship on which there is sufficient accommodation, he may be tempted, either on his account, or for humanitarian reasons in order to avoid the risk of imperilling non-combatants, to transfer them to the ship flying the Red Cross flag. But the duty of a hospital ship is to take on board wounded, sick, and shipwrecked combatants, and it does not come within her duties to provide accommodation for uninjured passengers and crews taken from destroyed merchant ships, thereby rendering valuable assistance to the warship from which they are taken. Should she be visited by an enemy cruiser while carrying such persons, she would be *prima facie* liable to capture. It is possible that a Prize Court might order her release where the 'military necessity' which caused the transference of such persons to the hospital ship was proved to be identical with the highest requirements of humanity, but it is not probable that anything short of the fact that a naval engagement was imminent would be held to afford a naval officer any justification for the transference from a warship to a hospital ship of the passengers and crews of sunken vessels. An officer who resorts to the extreme step of sinking a prize without waiting for the decision of a court of law must make his own arrangements for the reception of the persons on board ; he must be prepared to bear the odium which will attach to him if his action imperils their lives. The Hague Conventions of 1899 and 1907 were not entered into with a view of rendering inviolable ships which are used for the carriage of all victims of maritime warfare, but only those carrying the sick and wounded.

Up to the present the only instance in this war in which a hospital ship has been condemned was the case of the *Ophelia*, condemned by the London Naval Prize Court in May, 1915. The findings of the President of the Prize Court in the case were as follows :—

1. That the *Ophelia* had never in fact rendered any help, succour, or service whatsoever to any single wounded, sick, or shipwrecked men.
2. That she made no real effort at any time to render any such service.

3. That her construction and equipment, although to some extent made adaptable, were not well adapted for the purpose of a hospital ship.
4. That she was well equipped for the purpose of acting as a signalling ship.
5. That considerable signalling appliances had been used, and that no satisfactory evidence was given of why, how, or when they were used.
6. That her officers complied, and were at all times ready to comply, with any orders from the German ships of war or ships on auxiliary service.

On these conclusions the President delivered judgement, condemning the *Ophelia* as a lawful prize. This judgement was confirmed on appeal.

SECTION II.

THE S.S. 'DRINA' AND HER CONVERSION INTO A ROYAL NAVAL HOSPITAL SHIP.

CHAPTER III.

INTRODUCTORY.

As the intention of this record is to provide some guidance for the inexperienced, it may be well, before entering upon the detailed description of the *Drina*, to indicate certain points which have to be taken into account when improvising ships for hospital purposes. Some of these are referred to, but not explained, in the Admiralty specification, and they mainly fall under two categories: (1) *The selection of a suitable vessel*; and (2) *The location of specific hospital departments.*

1. Certain fairly obvious considerations afford guidance in this matter, although, with vessels not originally designed for the purpose, the decision eventually arrived at must in many instances be in the nature of a compromise.

With regard to the vexed question of size, the present war has demonstrated the impossibility of laying down any one definite standard, since all manner of craft, from the lordly *Mauretania* down to steam yachts like the *Sheelah*, have been utilized. The ideal at which to aim, however, is the combination of a draught shallow enough to enter harbours likely to be made use of, with sufficient tonnage to accommodate the required number of patients on decks at least 7½ ft. in height above the water line, and possessing an average cubic space of 500 ft. per head, with sufficient interval between the single-tier cots to allow of adequate nursing. Somewhere round about 8000 gross tonnage has been found to be a convenient size.

Steadiness at sea and maximum freedom from vibration are of course necessary, and must be secured by some of the means indicated in the preceding section, while the remarks made therein with regard to speed apply likewise to the improvised ship.

It is a decided advantage to have installations for wireless and submarine signalling already fitted, and also that the ship should be well supplied with store rooms, and particularly with refrigerating rooms and the necessary plant. Her storage capacity for water should likewise be large, and she should have ample distilling machinery. From what has already been said, it follows that her steam power must be ample to provide for secondary purposes such as heating and disinfection in addition to the main and auxiliary engines, and that, in the same way, the electrical plant must suffice for laundry, ventilation, hoists, etc., as well as for all forms of lighting and communication. Finally, her coal capacity (if an oil-driven vessel is not available) should be considerable, to avoid frequent coaling, and she should be well supplied with boats and with the most modern and noiseless apparatus for hoisting them.

2. The location of the various hospital departments referred to below is that laid down in the Admiralty specification, but to this have been added some reasons for such location, and also one or two additional suggestions derived from practical experience. The latter has shown that, on the whole, these arrangements have worked out well; a few deficient arrangements must necessarily occur where the ship's fittings are made use of.

There are certain departments of a hospital ship which it is, as a rule, desirable to locate as far aft as possible in order to ensure that odours or possible contagious material shall tend to be carried away rather than inboard. Thus the Admiralty specification directs that the infectious ward and mortuary should be on the poop. As the laundry produces steam, heat, and disagreeable odours, a similar position is likewise desirable for it, if possible.

For the wards, the essentials are as good natural lighting and ventilation as can be obtained, together with ample cubic space and easy approaches. So far as it is possible in an improvised vessel, the requirements laid down in the preceding section should be followed. The Admiralty specify the main deck for men's wards and the saloons or cabins for officers. Preparation- and operation-rooms, with sterilizer for dressings adjoining one of them, are to be erected in the most convenient position for light and air, but ready access from the acute surgical wards must also be kept in mind. In the *Drina* these requirements were met by an entirely new construction on the upper deck. This situation was, however, attended by an unquestionable disadvantage in the winter months, owing to the necessity of bringing the patient into the open, and direct covered communication should therefore be a *sine qua non.*

It is worth while referring here to Pannett's suggestion that the operating room need not be near the upper deck, where space is more useful for wards, as a more stable platform can be obtained well below, and ventilation difficulties can be overcome. Possibly this may be desirable where space is very limited, but the slight and somewhat problematical extra steadiness is of value on comparatively infrequent occasions, which, moreover, coincide with the maximum impurity of the air between decks.

Dispensary and other perishable stores should not be located where they can be affected by the heat of the engine-room or auxiliary engines. All that the Admiralty specify on this point is that there should be one dispensary on the main and one on the lower deck.

Another point of importance is the position and relations of the disinfector. The Admiralty direct that this, with latrines other than those for wards, drying-room, linen-room, soiled-linen-room, and galleys and bakeries should, for obvious reasons, be situated on the upper deck. As the disinfection of the infectious boat and working party is a very frequent duty of the hospital ship, I would lay stress on the importance of having a disinfector in a convenient position near the gangway, aft, to minimize contact, and in close proximity to a bathroom easy of access. It should also be in close relation to the laundry.

Finally, the possibilities of traffic have an important bearing on the best position for the out-patient and dental departments, and it is advisable to locate them also on the upper deck, somewhere adjacent to the gangway.

CHAPTER IV.

DESCRIPTION OF THE S.S. 'DRINA'

BEFORE HER CONVERSION INTO A HOSPITAL SHIP.

THE *Drina*, the fifth of the new large twin-screw steamers intended for the intermediate passenger service of the Royal Mail Steam Packet Company to Brazil, Uruguay, and the Argentine, constructed by Messrs. Harland and Wolff Ltd., left Belfast on January 16, 1913, on her maiden voyage.

Her dimensions are as follows :—

Length	..	517 ft. 3 in.
Breadth	..	62 ,, 3 ,,

She is fitted with bilge keels for steadiness, and twin screws ; and the water ballast consists of 2440 tons in 12 tanks. She has five decks, two complete and three partial ; is fitted with two masts (schooner rigged), an elliptical stern, and is clincher built, with framework of steel and eight bulkheads.

Depth from top of beam amidships to top of keel	44·5 ft.
Length of engine room	98·0 ,,

Displacement.

22,220 tons.

Propelling Engines.

Number of sets of engines—2.
Reciprocating engines—inverted direct-acting quadruple-expansion condensing.
Length of stroke—51 in.
Nominal h.p.—1140.
Indicated h.p.—6350.
Speed—13 knots.

The engines are arranged on the 'balanced' principle, which has been so successful in eliminating vibration, a very essential characteristic in a ship of the mercantile marine selected for conversion into a hospital ship.

Boilers.

Description — horizontal, cylindrical, multitubular, return tube.

Number—2 double-ended and 2 single-ended.
Steel. Loaded pressure 215 lb. per square inch.

Tonnage.

Gross tonnage—11,482·75.
Register tonnage—7287·94.

Boat Capacity.

For 1160 persons, distributed as follows :—
10 life-boats carrying 54 persons each.
10 collapsible life-boats, 52 each.
2 cutters, 30 each.
2 steam launches, 20 each.
Has to carry 1300 life-belts.
Has 18 life-buoys with lights attached.
1 breeches-buoy supplied by the Admiralty.

Coal Capacity.

3400 tons.

Complement.

9 Officers.
11 Engineer officers.
51 Deck hands.
50 Engine-room hands.
55 Stewards.

Accommodation.

First Class :

Shelter deck, forward—extends full breadth of vessel.
Smoking-room—upper deck, aft.
Verandah—after end of smoking-room.
Lounge—upper deck, forward.
Cabins—upper deck, and shelter deck, port side.
Starboard side—11 upper deck
Port side—12 upper deck
} Accommodation for 111 first-class passengers.

Second Class :

Shelter deck, aft.
Smoking-room—on poop deck.
Cabins—under poop, port side. Accommodation for 45 intermediate-class passengers.

Third Class :

Smoking-room—shelter deck, aft.
Saloon—main deck, amidships.

Shelter—under forecastle and fitted with seats.

The main deck is fitted to carry 920 steerage and third-class passengers.

See Fig. 1 *for deck plans of the above-described accommodation.*

Cargo.

The *Drina* will carry a large quantity of cargo, having holds insulated for the conveyance of chilled or frozen meat. There are also compartments insulated for dairy produce and fruit.

The appliances, which are of the most modern type, for working the ship and cargo, consist of steam winches, and are now employed for hoisting in the patients. Although easy running they have the disadvantage of being noisy. The vessel has a complete electric-light installation, and also has the submarine signalling apparatus.

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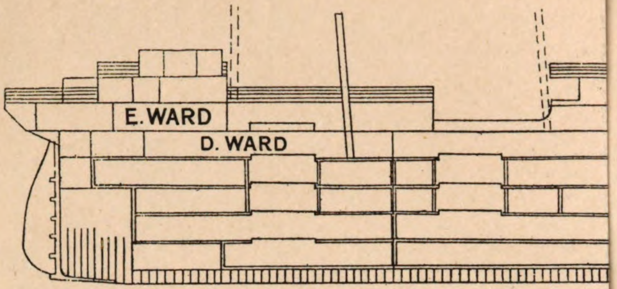
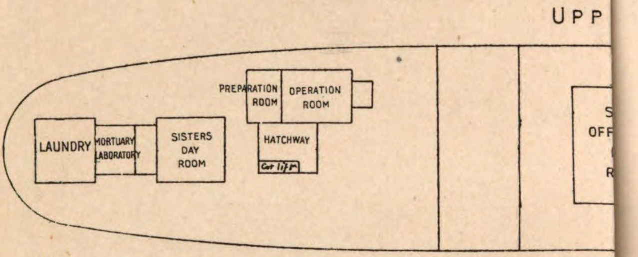
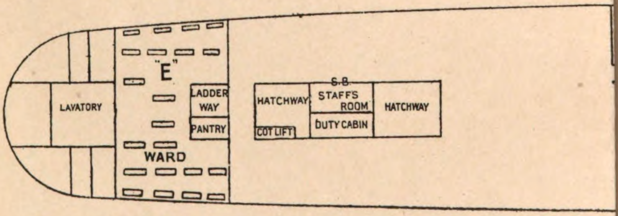
"DRINA"

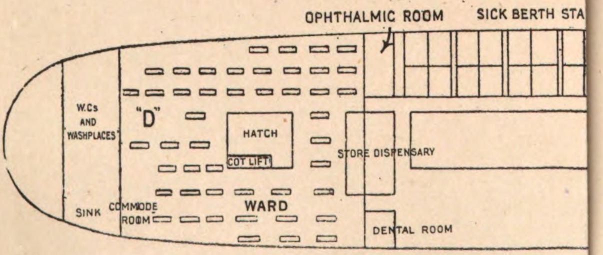
NAVAL HOSPITAL SHIP

Note:- *This drawing is not strictly to scale*









CHAPTER V.

CONVERSION OF THE S.S. 'DRINA' TO THE R.N.H.S. 'DRINA' No. 3.

On arrival of the vessel in Liverpool on Tuesday, August 4, 1914, she was inspected with a view to adoption by the Admiralty as a hospital ship, and was handed over to the contractors, Messrs. H. and C. Grayson Ltd., of Liverpool, for immediate conversion. The main and shelter decks were cleared of all passenger accommodation, ready for the erection of various wards. Five new wards were constructed, of which A, B, C, and D were situated on the main deck, while E ward was under the poop. The space occupied by D and E wards was originally accommodation for the intermediate class of passengers. F ward was the ship's hospital, but it was originally used for the passengers and crew. The annexes were erected in the

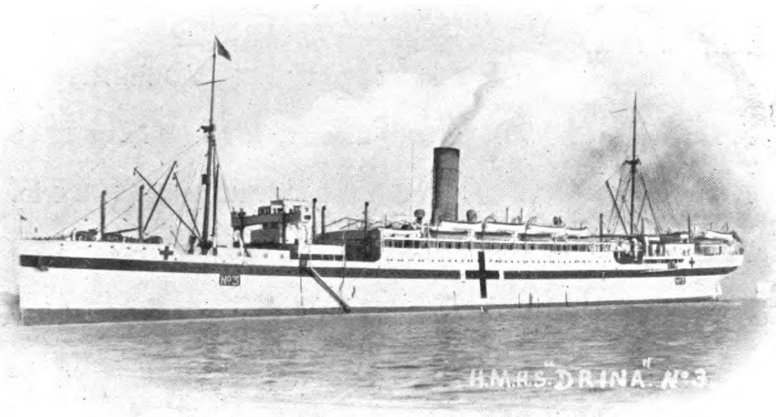


Fig. 2.—The Royal Naval Hospital Ship *Drina.*

four corners of each ward; pantry, bathroom, and wash-place on one side, commode-room and sanitary accommodation on the other. All the wards except C had access to the shelter deck by means of wide and easy stairways. The officers' wards, originally first-class cabin accommodation, were situated on the port side of the shelter deck.

The fitting of water- and steam-pipes, which entails a great deal of work and time, was commenced as soon as the deck was cleared. On the completion of the linen cupboards, nursing sisters' cupboards, and lockers for patients, the wards were painted, decks scrubbed, and linoleum fixed. The cots were then placed and secured, allowing a three-feet alleyway, the whole reconstruction taking exactly ten days. After being in commission for some months, it was found that ballast, in addition to water and coal, was necessary, on account of difficulty in steering, due to so much of the rudder being out of water; 1000 tons of sand were obtained for the purpose, and proved adequate.

Officer Patients' Accommodation.

There were three wards set apart for officers :—

A Surgical Ward with 6 beds measured 30 ft. 9 in. × 17 ft. 4 in. × 7 ft. 8 in.

A Medical Ward with 10 beds measured 52 ft. 2 in. × 17 ft. 4 in. × 7 ft. 8 in.

A Warrant Officers' Ward with 4 beds measured 21 ft. 4 in. × 17 ft. 4 in. × 7 ft. 8 in.

The ward for warrant officers was fitted with a table for messing.

A detailed description of a ward is given later; this description applies to the officers' wards also.

In addition to the above, five cabins on the upper deck were set aside for the use of senior officer patients. The mess-room for officer patients measured 11 ft. 8 in. × 17 ft. 4 in. × 7 ft. 8 in. The smoking-room at the after end of the bridge deck, with a verandah, was allotted them as a sitting-room.

Men's Accommodation (with description of a Ward).

There were 8 wards for the men :—

A	ward, containing ..	25 beds.
B	,, ,, ..	40 ,,
C	,, ,, ..	25 ,,
D	,, ,, ..	46 ,,

E	ward, containing	..	21 beds.
F	,, ,,	..	24 ,,
Infectious	,, ,,	..	8 ,,
Mental	,, ,,	..	3 ,,

A description in detail will be given of a ward, and the largest of them (ward D) will be taken as the type (See *Fig.* 3).

Description of D Ward.—This ward occupied the whole breadth of the aft part of the ship ; the main deck (which was white pine wood) formed the floor, the deck above was the roof, bulkheads formed the fore and aft boundaries, while the sides of the vessel constituted the lateral limits of the ward.

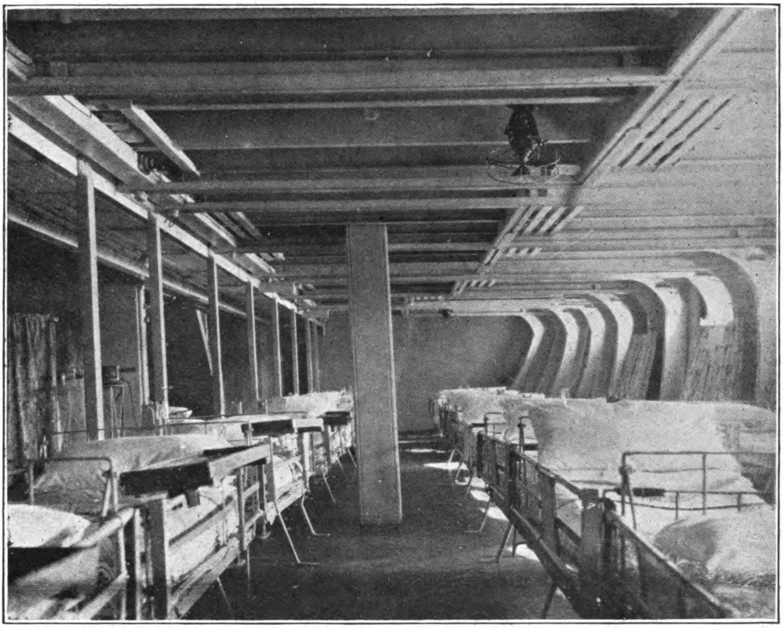


Fig. 3.—D WARD IN H.M. HOSPITAL SHIP *Drina.*

Floor Space and Cubic Space.—The total floor space comprised 4161 ft., the height of the ward being 7 ft. 8 in., while the cubic capacity was 29,127 cubic feet, i.e., 633 cubic feet per bed.

Lift.—There was a large cargo hatchway in the middle of the ward, and a lift for the conveyance of cot cases to and from the decks above occupied a portion of it.

Floor.—The floor of the alleyways between the cots was covered with strips of dark-red linoleum 3 feet wide; the surface of the cargo hatchway was also covered with the same material. This was rapidly fitted, and possessed the advantage of being warm, easily cleansed, and quickly dried. The deck under the cots (not covered with linoleum) was painted with shellac, and kept polished with the following mixture:—Beeswax, 1 ounce; turpentine substitute, 1 pint. I am indebted to Mr. S. Dunstan, F.C.S., chief dispenser of the Royal Victoria Infirmary, Newcastle-upon-Tyne, for this excellent prescription.

Natural Ventilation.—Natural ventilation was adequate and was ordinarily employed. On each side of the ward were thirteen circular scuttles (sidelights), which were 12 in. in diameter. These scuttles (the lower borders of which were 5½ ft. above the level of the beds) were 14 ft. from the surface of the sea (when calm), and it was seldom that they could not be kept fully open. Utley's patent ventilators were also fitted. They enabled air to enter when, on account of bad weather, it was necessary to close the scuttles. The air passed through a small grating to a chamber containing two cork floats situated at the upper part of the scuttle. Should a sea wash on to and enter the grating, the cork floats are forced upwards and block the upper entrance, and thus prevent the water reaching the interior of the compartment. In addition to the scuttles there were three oblong ventilating shafts, 1½ ft. by 1 ft., one on the port side, the other two on the starboard side of the ship. These were of the cowl type commonly fitted in ships, and the movable cowl extremity of the outer end opened to the fresh air 9 ft. from the roof of the ward. They were able to act either as inlet or exhaust.

Artificial Ventilation.—The large ventilators just mentioned were also employed in the provision of artificial ventilation, when this was required, in addition to the natural means. A centrifugal fan was fitted in their lower end, which exhausted the vitiated air from the ward. If these fans are working, ventilation becomes artificial and not natural.

To assist in the distribution of the fresh air there were dispersed at regular intervals (20 ft.) on the roof of the ward eight smaller axial electric fans; each was worked from a separate switch. The various means of ventilation gave satisfactory results both in good and foul weather, and no addition would appear to be necessary.

Lighting.—Thanks to the number of large scuttles on each side, together with the height, the natural lighting of the ward was good. Electricity was the source of artificial illumination both in the ward and its annexes, a lamp of 25-candle power being provided for every 12 square feet of roof space of the ward.

Heating.—Artificial heating was obtained from eight vertical radiators heated by steam, which were distributed at regular intervals round the outer margin of the ward.

Painting.—The interior was painted in a pale-green colour; this colour was serviceable, did not absorb too much light, and it looked well.

Means of Intercommunication.—The means of intercommunication consisted of a bell in each men's ward and a bell over each bed in the officers' wards. The indicator board for the wards was situated close to the quarters of the nursing staff, and that for the officers near the cabin indicator board. Owing to the short time available for reconstruction it was regretted that no telephone system, a very necessary adjunct to a hospital ship, could be fitted.

Arrangement of Beds.—The forty-six beds were arranged in rows in single tiers, and in blocks of three as far as possible; they were numbered consecutively, each having appended to the cross-bar of the lower end a metal clip with the number of that bed painted on.

Alleyway.—To obtain the requisite three-feet-wide alleyway, a considerable amount, in aggregate, of the floor space was unoccupied by beds.

Distribution of Cots.—It is well known that floor space is much more restricted on board ship than ashore, a fact perhaps to some extent compensated for by the purity of the air supply and consequently the average floor space per bed (94 square feet) may appear at first sight excessive. It must be pointed out, however, that although each row of beds was separated from the next row by the three-foot alleyway, a further considerable area of floor space was not available for fixed beds owing to the large cargo hatchway in the middle of the ward.

The Cots.—The cots were the service pattern. They are all metal, and each end is suspended on an iron pillar which permits the bed to swing free from the lateral motion of the ship, though they can be fixed, and are ordinarily kept so. The nursing of a patient is greatly facilitated by the sides of the cot being removable, and also by the width of the alleyway. The majority of the cots were 6¼ ft. long and 2¾ ft. wide, but there were also twenty special cots for fracture cases. These cots only differed from the ordinary by being 6 in. wider and 12 in. longer.

Attached to the head of each bed was a linen satchel 1 foot long and 10 inches deep. In this the patient kept his letters, brush and comb, etc.

Sanitary Arrangements.—With the exception of the commode-room, the various sanitary conveniences were situated outside the ward at its aftermost end, being separated from it by a bulkhead which was pierced by two separate doorways. The space thus constituted was subdivided by a fore-and-aft division into two portions, and one of the doorways from the ward opened into each of these, to which it provided the only means of access. Separate scuttles to the outside air opened into each of the subdivisions, which contained the general lavatory arrangements detailed below. It will be observed, therefore, that by its position and arrangement air tended to be drawn from the ward and to escape via the lavatory annexe rather than vice versa. It would, however, have been an improvement if this annexe had been fitted with exhaust fans.

The following list gives in detail the contents of the entire annexe :—

Two baths in separate rooms.
Eight wash-basins, metal, coated with porcelain.
Three oblong porcelain-coated metal sinks, 18 in, × 24 in. × 15 in., for washing ward utensils, towels, etc. (each fitted with hot and cold water).
One large hopper for slops, around the inside of the upper margin of which was a 3-in. metal pipe with perforations. The forceful stream of water supplied was perfect for flushing.
Eight water-closets of the short hopper pattern, with strong flush of water.
Urinal stall.
Three looking-glasses, each 15 in. × 12 in
Forty-six brass towel-hooks distributed in rows, and numbered consecutively 1 to 46 ; these hooks were for the patients' towels, so that each patient could always have his own.

Commode-room.—The commode-room has already been stated to be situated apart from the remainder of the sanitary conveniences, and was partitioned off in the aftermost starboard corner of the ward itself. It was 9 ft. long and 8½ ft. wide, and in it were kept the ward bed-pans and urinal bottles. These were stored on superimposed wooden shelves, divided into compartments ; each compartment measured 14 in. high × 18 in.

deep × 12 in. wide, being provided with a rolling batten (a batten nailed to the lower margin to prevent the articles falling out during the rolling of the ship).

Dirty Linen Cupboard.—In the corner of the commode-room was a large cupboard for soiled linen; it was 3 ft. wide, 3½ ft. deep, stretched from deck to deck, and had two equidistant shelves; the three compartments thus formed were lined with zinc. The commode-room also contained a wickerwork basket 3 ft. long × 2 ft. × 1½ ft. deep, for the temporary storage of soiled linen. These baskets have been found more satisfactory for soiled linen than the zinc-lined cupboards, because the latter quickly became offensive.

Ward Pantry.—The ward pantry occupied the fore starboard corner of the ward, being partitioned off from this, the two walls necessary to complete the construction of a room being of wood. It was lighted by two of the scuttles on the side of the ship. The room measured 11 ft. 2 in. × 12 ft. 10 in., and contained :—

> A large dresser, 6 ft. long, 2 ft. 3 in. wide, 6 ft. 3 in. high, with drawers and cupboards (one zinc-lined). A delf rack for storage of the ward crockery rested on top.
>
> A geyser for obtaining hot water, cold water being effectively heated by a steam jacket.
>
> A hot press, 3 ft. 10 in. × 2 ft. 2 in. × 2 ft. 6 in., steam heated, for keeping food warm.
>
> A zinc-lined sink with cupboard underneath (trough, 1 ft. 6 in. × 2 ft. 6 in. × 8¾ in., complete, 3 ft. × 2 ft. 10 in. × 2 ft. 3 in.), for washing up dishes, etc.; there was a cold-water tap only, but coiled round the interior of the sink was a steam pipe with perforations for heating cold water lying in the sink. The waste pipe was trapped to prevent any smell reaching the room.

Ward Cupboards.—There were two lock-up cupboards, with three shelves equidistant: (1) 6 ft. × 3 ft. × 7 ft. for linen; (2) 3 ft. × 3 ft. × 6 ft. for stock medicines and dressings for ward use. In addition to these, on the starboard wall of the ward was fixed a large cupboard, 13 ft. 6 in. × 4 ft., which was subdivided into forty-six compartments, each having a separate door. Each small cupboard measured 15 in. × 9 in. × 12 in., and was ample for the storage of a patient's immediate necessities. They were numbered 1 to 46, to correspond with the beds.

Looking-glass.—Two looking-glasses, 3¼ ft. × 1¾ ft.

Ice Chest.—An ice chest, 3 ft. × 2 ft. × 1 ft. 10 in., occupied a portion of the floor against a central bulkhead. In this perishable goods were stored.

Lift.—The lift consists of a lidless oblong wooden box and a hand-winch. The box was 9 ft. × 3 ft. × 10 in., and one side was hinged to open outwards in order to conveniently slide in and out the cot containing the patient. On the outside of each of the two ends of the box were two runners which ran on either side of a stout vertical wooden pole; these kept the box steady while it was travelling. The lift was elevated and lowered by means of two wire hawsers attached to a hand-winch which was worked by two men. By fixing the catch of a ratchet on a cog of a circular cogged wheel the box was supposed to be kept steady at any level desired, but this was found to be insufficient, and on one occasion the lift took charge and fell from top to bottom, fortunately without injuring anyone. After this experience, which illustrates one of the disadvantages of necessarily hurried reconstruction, an efficient hand-brake was fitted.

Patients' Table.—Secured to the middle of the cargo hatchway was a wooden table, 14 ft. long by 2 ft. 2 in. wide, with a rolling batten fixed along the margins. On each side was a wooden form for seating convalescent patients, who had their meals on the table, and used it for reading, writing, or playing games.

Surgeon's Washstands.—Against bulkheads fore and aft there were double washstands for the use of the surgeon. They were detachable, and of the ordinary pattern fitted in the cabins of passenger steamers. Water was stored in a tank at the upper part behind a mirror, and flowed by gravity through a tap to the bowl, while the used water reached a removable receiver below the level of the wash-basin by tipping up the latter. When not in use the bowl could, by means of a hinge, be closed up and made to assume a vertical position, thus conserving space.

Life-belt.—On the roof above each bed was a wooden rack to hold a cork life-belt; one was provided for every patient.

Fire Extinguishers.—Hung on the wall were four extinguishers (the Kyl Fyre apparatus).

List of Stores Issued.—A list of all stores issued to the ward was kept by the sick-berth steward in charge of the ward (*see* 'Care of Stores,' pp. 77–81).

Ward Notices.—The following printed or typewritten notices were hung up in the ward:—

Boat stations.
Precautions against fire.
Emergency accommodation.
Duty staff for the ward.

Infectious Ward.—This was situated on the poop deck as far aft as possible, in order that anything contagious might be carried away rather than inboard. It consisted of two 3-cot wards measuring 14 ft. 4 in. × 13 ft. 4 in. × 6 ft. 10 in., with bath and w.c. The two wards could be completely separated, and so allowed for the accommodation of two different kinds of infectious disease. In addition there were adjacent two single-berth cabins (10 feet × 9 ft × 6 ft. 10 in.) for observation cases.

Wards for Mental Cases.—Two padded rooms were situated on the main deck, port side (7 ft. 4 in. × 6 ft. 5 in. × 7 ft. 8 in.). Adjoining these was a small isolation ward (18 ft. 2 in. × 13 ft. 9 in. × 7 ft. 8 in.), with three cots, bath, and w.c. These were some distance from the main wards, in view of the possibility of their having to accommodate noisy maniacal patients.

Accommodation for the Medical Staff, and Nursing Sisters.—Their cabins were situated on the upper deck, their sitting-room was at the forward end of the upper deck, corresponding to the smoking-room aft, while the mess-room was on the shelter deck immediately below. A workroom for the sisters was situated aft on the upper deck.

Accommodation for the Sick-berth Staff.—The cabins, which each contained four berths, were on the main deck, port side, between C and D wards. It was a convenient position, as the staff, being adjacent to the wards, were at hand if wanted. Their sitting-room was situated on the shelter deck; it was originally the third-class smoking-room.

The Out-patient Department.—As a number of men come on board for treatment of small wounds and abrasions, and it is undesirable to dress them in the wards, a department for out-patients was established. These men belong to supply ships, colliers, trawlers, and also to destroyers that have no parent ship in port. The room was situated on the main deck, but a more suitable site would have been on the upper deck near one of the gangways, on account of the traffic. A waiting-room did not prove necessary.

The out-patient department measured 9 ft. 6 in. × 8 ft. 6 in. × 7 ft. 8 in., and contained a washing-basin for the surgeon, form and table, dressing tin, and the instruments required for out-patient dressings and minor surgery; the weighing machine was also kept there.

The Dental Department.—This was originally situated on the main deck, aft, starboard side, and measured 9 ft. 6 in. × 9 ft. × 7 ft. 8 in. This room was fitted with a complete dental outfit, including dental chair, shelves, porcelain sink with hot and cold water, mirror, and tables. It was painted throughout in enamel white. On account of the traffic the situation on the main deck was found to be very unsuitable, and the fore operating theatre, situated on the upper deck on the port side, close to the foremost gangway, was at a later stage converted into a dental room, and proved a most successful adaptation with regard to ventilation, overhead light, and easy access. Since men are sent from ships for dental treatment in batches, a waiting-room becomes a real necessity. In the *Drina* the crew live on the starboard side of the lower deck instead of in their customary quarters under the forecastle; consequently the latter space was available as a comfortable shelter, fitted with seats and artificially heated. Part of this was used as a smoking-shelter for convalescents, but on the port side the space was allotted to the dental patients awaiting treatment. Being close to the dental room it met all requirements.

In addition to a waiting-room, a small annexe should be fitted with a sink and hot and cold water, in order that patients may be able to rinse out their mouths and have something to spit into. A temporary annexe of this kind was fitted under the forecastle. If this is not done the men spit into the scuppers (a gutter for carrying off the water from the upper deck), and a very unhygienic and unsightly state of affairs will result.

When the function of the hospital ship is that of a base hospital to the fleet, that is to say, admitting sick and injured, a great amount of dental work has to be done, and the surgical work will only require the use of one operating theatre.

The Examination Dark Room.—This measured 9 ft. 6 in. × 9 ft. × 7 ft. 8 in. It was intended for the examination of the eye, ear, nose, and throat, and was situated on the main deck aft, port side, and fitted with ophthalmic electric lamp, two chairs, a table, and deadlight (i.e. a covering over the scuttle to shut out the light). It was painted throughout a dull black.

The X-ray Department.—This department was situated on the awning deck beneath the fore bridge. The compartment was originally occupied by lavatories; these were cleared away, and a room measuring 23 ft. 8 in. × 9 ft. 6 in. × 7 ft. 9 in. was available. It was painted throughout a dull black, and the door was widened to 4 ft. 6 in. in order to facilitate ingress and egress of cot cases. By means of a partition the compartment was divided into two, the larger room, measuring 15 ft. 2 in. × 9 ft. 6 in. × 7 ft. 9 in., for the examination of cases, and the smaller room, 8 ft. 6 in. × 9 ft. 6 in. × 7 ft. 9 in., for use as a photographic dark room.

The Examination Room.—A stretcher table 6 ft. × 2 ft. 3 in. occupied the middle of the room. By this means a case could be brought in on a stretcher and examined with the screen without moving the patient. A second table, measuring 7 ft. 3 in. × 2 ft. 6 in., was fixed against the bulkhead and used when a photograph was required. In addition there was a cupboard (2 ft. × 2 ft. × 7 ft. 9 in.) divided by two shelves for tubes and accessories. Daylight could be admitted by three ports when required, and was shut out by means of deadlights.

Photographic Room.—This room contained a large cupboard (3 ft. 7 in. × 1 ft. 8 in. × 7 ft. 9 in.) divided up by four shelves and lined with lead (to prevent penetration of *x* rays) for the storage of plates and photographic material. A bench was fitted (4 ft. 4 in. × 1 ft. 9 in.) with dark-room lamp for developing plates, and shelves above (3 ft. 7 in. × 9 in.) for the various solutions required. At the right end of the bench was a sink (18 in. × 26 in. × 16 in. deep), with fresh water laid on. The room was fitted with a single port and deadlight.

The Laboratory.—This measured 11 ft. × 7 ft. × 7 ft. 6 in. It was situated aft on the poop deck, and was thus not only in convenient relation to the post-mortem room, but was in a position where unauthorized persons are less likely to intrude and possibly meddle with dangerous infective contents, such as virulent live organisms.

A bench with glass top was provided, two frosted lamps for microscopic work, a bench for an electric incubator, and a centrifugal machine; a bench with slate top for small electric sterilizer, and a media cupboard, 2 ft. × 2 ft. × 7 ft. 6 in., with two shelves. A sink, with fresh water laid on, was fitted. The room was heated by steam and had a cement floor. It is seen that the constantly available and convenient electric current was made use of for maintaining the temperature of incubators, etc.

The Mortuary.—Measuring 11 ft. 3 in. × 7 ft. 10 in. × 7 ft. 6 in.; this was situated aft on the poop deck (port side) to avert the possibility of nuisance from unpleasant odours, and to be out of the way. It was fitted with a lead-lined table grooved and centrally drained, porcelain wash basins, and fresh water was laid on; the floor was cemented.

The Duty Cabin.—The 'duty cabin' is a room which is a characteristic feature of all naval hospitals and sick quarters. It is a place of meetings for medical officers every morning at 9 o'clock before commencing their visit to the wards. The names of all medical officers on duty for the day are exhibited in this room, and they must leave information here as to the exact part of the ship where they may be found.

In the hospital ship *Drina* it was an office where the ward-master did all the book and paper work in connection with the entry and discharge of patients. It was also the centre of organization, and, as will be seen later, the three branches of the organization which entail a considerable amount of writing were worked from here:—

1. Embarkation routine: (*a*) Ordinary; (*b*) Emergency.
2. Disembarkation routine: (*a*) Ordinary; (*b*) Emergency.
3. Book routine.

The 'duty cabin' was situated aft under the poop, and measured 32 ft. 2 in. × 14 ft. 4 in. × 7 ft. 8 in.

The Dispensary.—This was situated on the main deck aft, adjoining D ward. It measured 22 ft. 4 in. × 7 ft. 6 in. × 7 ft. 8 in. A sink was fitted with cold water laid on; there was also a filter. The dispensary store-room adjoined it.

The Operating Theatres.—There were two separate operating theatres, one forward (used as a dental room), the other aft. They were built on to the upper deck adjacent to the upper end of each lift respectively. Each theatre was divided by a partition with a sliding door into two compartments, a preparation room and an operating room.

Construction.—The structure was boarded inside and out with 1½-in. deal, while the floor consisted of porcelain yellow tiles embedded in 4 in. of cement. The roof was flat, and overlapped 3 inches to prevent the rain from running down the sides, and was originally covered with painted canvas. This latter however was not satisfactory, and the roofs had to be covered with heavy-grade rubber, which made them perfectly watertight.

Preparation Room.—The preparation room measured 10 ft. × 14 ft. × 7 ft. 8 in. high.

Operating Room.—The operating room was larger, and was 20 ft. × 15 ft. × 7 ft. 8 in. These two rooms communicated with each other through a sliding door, the opening being 5¼ ft. wide.

Doors.—Each room could be separately entered from the outside through double doors opening outwards, the entrance to the preparation room being 4¾ ft. wide, while the exit from the operating room was 4 ft. wide. These two separate entrances are to save valuable time during a rush of operative work: e.g., a patient is anæsthetized on the table in the preparation room, and is ready for conveyance to the operating table immediately this has been vacated (via the exit direct to the outside) by the previous patient.

Lighting.—The lighting, both natural and artificial, was quite adequate. On two of the preparation room walls were two windows each 33 in. × 30 in., the lower margin of the framework of each being 45 inches from the ground. In the operating room there were four similar windows; in addition to these, however, there was a skylight in the roof, its roof space occupying 27½ feet square. The window glass was frosted.

Artificial lighting was by electricity. There were four single lights in the roof, two in each room, while over the operating table, in the centre of the room, were two separate clusters of lights (each cluster with a reflector), one having eight lamps, the other holding four lamps. Each cluster was connected with a different electric circuit in case one went wrong during a night operation. Each lamp was 50 candle power.

There were three wall plugs, two of which could be used for heating the electric sterilizer, while the third was for a lamp with a wandering lead.

Two side windows could be opened by the upper margins falling inwards, and the windows of the skylight could also be fixed open in any position. There were two axial electric fans on the roof of the operating room.

Water Supply and Wash-basins.—Hot and cold water were laid on in both rooms, the hot water being obtained by steam circulating through a geyser. In a corner of the operating room was a wash-basin for the surgeon; above the basin was a small shelf, 21 in. × 9 in. (with rolling batten), to hold the bottles whose contents were necessary for hand sterilization.

In the opposing corner in the preparation room was a glazed washing-sink (inside measurement 22½ in. × 11½ in. × 7 in.), where basins, etc., could be scrubbed.

Cupboards and Shelves.—Fixed to the wall of the preparation room, and adjacent to the washing-sink, was a cupboard with a teak-wood top, 3 ft. 10 in. × 16 in. The latter sloped towards and overlapped one side of the sink; the surface was grooved so that any fluid could drain into the sink. The other free margins had rolling battens; this surface was used for scrubbing mackintoshes, etc., after an operation. The cupboard was 3 ft. high, and had two shelves; in it were kept the attendants' gear for cleaning the theatre. Three of the remaining corners of the preparation and operating rooms were used to make other cupboards. Each of these had a wooden door excepting the one used as a surgical instrument cupboard, which had a glass-fronted door. These cupboards stored instruments, dressings, and anæsthetic gear respectively. In addition to the cupboards, other corners were used for shelves for storing lotions in current use. On each side of the operating room (under the windows) were a pair of superimposed shelves, 3 ft. × 1 ft. 2 in.; they were a foot apart, the lower one being 33 in. from the floor, and each had a rolling batten. Dressing boxes, glass jars, drains, etc., were kept on these shelves. Fixed to one side of the operating room were two other superimposed shelves, 3½ ft. × 14 in., and two feet apart. Each shelf had three recesses on the upper surface to hold securely a corresponding number of large glazed jars for storing sterilized operation mops and dressings. On one wall was a small looking-glass.

Movable Fittings.—The movable fittings were :—

Operating table.
Wooden anæsthetizing table, 6½ ft. × 2 ft. 1 in. × 2 ft. 11 in.
Wooden stool for anæsthetist.
Metal table, with glass top, for anæsthetist's gear.
Wooden table for mops, 34 in. × 18 in. × 32 in.
Wooden table for instruments, 34 in. × 18 in. × 32 in.
Iron-topped table, 2 ft. × 2 ft. × 3 ft., for the electric sterilizer.
Wooden ledge, 3¾ ft. × 9 in., and 10 in. off the ground, to hold the sterilizing tins.

Temporary Operating Theatre.—It was owing to the construction of the ship that it was necessary to build the operating theatres on the upper deck. This position, with regard to lighting, cleanliness, and ready access, was all that could be desired, and the lift from the ward was close adjoining; but the patient had to be taken into the open air, which was a very decided disadvantage in the winter months, especially at night.

It therefore became necessary to select a place between decks, adjoining the ward, which could be used as an operating theatre if necessary. The pantry of D ward was the only space available, and it possessed the advantage of having hot and cold water laid on. The pantry fittings were removed, and the compartment was thoroughly cleansed and painted throughout with white enamel. A portion of the ward was taken in, which allowed for a small preparation room. The pantry in the adjoining ward was used in place of the one converted, and did duty for the two wards; on account of its convenient position this joint pantry arrangement met all requirements.

The Steam (Dressing) Sterilizer.—Adjoining the forward preparation room was a small annexe in which was fitted an Alliot and Paton high-pressure steam sterilizer for surgical dressings and requirements for operations. In the roof of the annexe a ventilator was fixed to allow for the escape of steam; it was an important fixture, as otherwise the steam would escape into the preparation room. It is not advisable to have the sterilizer fitted in the preparation room (i.e., without an annexe), as when in use it fills the compartment with steam.

The apparatus was joined up with the winch steam supply, which ensures a high pressure. It consisted of a jacketed chamber with a door at one end. Steam was admitted to the jacket at a pressure of 30 lb. per square inch. Fittings for the control of the steam supply and pressure were provided, together with a vacuum-producing apparatus.

The Electric Laundry.—The laundry was situated on the poop deck right aft, in order that the steam, heat, and smell produced might be carried straight outboard.

The machinery was as follows:—

Motor of 6 H.P.
Washing machine.
Hydro extractor.
Ironing machine.
Drying closet of six horses.

Fresh water was laid on, and two troughs were fitted with a tap over each, the water being heated by a steam-pipe led into the bottom; from ten to twelve tons (2440 to 2880 gallons) were used daily. A small room was fitted with shelves, an ironing table, and two electric irons.

When the ship entered port for the disembarkation of patients, an inventory of all soiled linen was prepared, the articles were packed into large linen sacks, and sent to the nearest shore laundry. This enabled all the hospital linen to be clean and ready for use in a few days, which would not be the case if left for the ship laundry, on account of the sudden large amount that has to be done when all the patients are discharged.

The Steam Disinfector.—A Geneste and Herscher's apparatus was a ship's fitting. It was situated on the upper deck aft, near the gangway, in order to minimize the chances of contact with infectious material. Adjoining was a bathroom for disinfection of the person.

The Soda-water Machine.—This machine, with a 20-gallon cylinder, was made by J. P. Jackson & Co., Liverpool. In a temperate climate very little is used.

The Water-distilling Apparatus.—A Quiggan's apparatus making 2000 gallons per diem was already in the ship. A second apparatus making 6000 gallons per diem was added.

The Refrigerator Store-room.—These provision chambers were very complete and up to date, holding 40 tons. They were as follows :—

Meat	2075	cubic feet,	25 tons	weight
Poultry	480	,,	2	,,
Fresh fish	520	,,	3	,,
Salt fish	240	,,		
Fruit and vegetables ..	1250	,,	5	,,
Cheese and butter, bacon	480	,,	5	,,

In addition to these refrigerated store-rooms, there were other well-arranged store-rooms for dry goods, etc. :—

Bulk store	825	cubic feet
Bonded store	500	,,
Flour store	590	,,
Issuing room	780	,,
Beer and wine room	656	,,
Mineral waters..	380	,,
Wines and beers	965	,,

The Store-rooms.—

1. The Main Store.—This was situated on No. 2 lower deck, and was approached from No. 2 trunk hatch by means of a ladder-way. This deck was divided up as follows :—

Port Side:—

a. Baggage Store for Patients.—It was fitted with three shelves equidistant (the floor making one shelf), 3 ft. wide. Rolling batten. Alleyways 3 ft. wide. The room measured 29 ft. 4 in. × 25 ft. × 6 ft. 10 in., and was provided in appropriate positions with numbers corresponding to each bed in each ward, that is to say, a total of 224. Outside it was a deck space measuring 23 ft. 8 in. × 18 ft. 6 in. × 6 ft. 10 in., which could be used as a temporary baggage store should the number of patients exceed 224.

b. Bedding Store.—24 ft. 9 in. × 13 ft. 9 in. × 6 ft. 10 in. Surplus bedding and hospital clothing were stored here. The measurements of this room are important, as ample room is required for the storage of all bedding in use in the various wards when the ship comes to port for disembarkation or refitting; all bedding must then be removed from the cots and carefully stored for the time being. The hospital clothing, after being in use, is disinfected, washed, and returned to the ward cupboards.

Starboard Side:—

d. Surgical Dressings.—14 ft. 6 in. × 22 ft. 6 in. × 6 ft. 10 in. The storage capacity of a room this size was 405 bales. The standard size of a bale of surgical dressings measures 27 in. × 22 in. × 15 in.

e. Crockery and Utensils.—14 ft. × 22 ft. 6 in. × 6 ft. 10 in. The surplus articles were kept packed in straw in cases to prevent breakage during the movements of the ship in bad weather. There was ample space in this storeroom.

f. Box-room for Empties.—17 ft. 6 in. × 14 ft. 6 in. × 6 ft. 10 in. The measurements of this room are important, and it should be of considerable dimensions. A room twice the size of the above is required in a ship which will later revert to her work as a merchant ship. Costly appliances have to be repacked, and the original cases must be kept for this purpose.

g. Surgical Dressings.—10 ft. × 14 ft. × 6 ft. 10 in. Storage capacity for 110 bales. A bale measures 27 in. × 22 in. × 15 in.

2. READY STORE.—20 ft. 6 in. × 16 ft. × 7 ft. 8 in. This was situated on the main deck in B ward close to the ladder-way leading down to the main store. I lay stress on the convenience of this position, for it was adjacent to both the main store-room

and the wards. It could be easily and quickly replenished when necessary. In addition to surgical dressings and appliances of every kind, it contained twenty cots, already equipped with bedding for any sudden emergency.

3. DISPENSARY STORE.—15 ft. 9 in. × 6 ft. 6 in. × 7 ft. 8 in. The dispensary store adjoined the dispensary and allowed of ample storage room. Drugs of all kinds were kept here, and formed a ready means of supply for the dispensary. In addition to this there was a small store adjoining the out-patient department, where disinfectants only were stored. It measured 9 ft. 6 in. × 9 ft. 10 in. × 7 ft. 8 in. This latter room was also used as a slop-room (i.e., a room for clothing, socks, boots, etc., which the Admiralty provides for naval ratings, and which can be purchased at very low cost).

SECTION III.

ORDINARY ORGANIZATION,

THIS is described under the following subdivisions :—

1. The Staff, Medical and Surgical (allocation of duties).
2. The Embarkation Routine.
3. The Disembarkation Routine.
4. The Book Routine.
5. The Operating Theatre Staff and their Duties.
6. The Dental Department.
7. The *x*-ray Department.
8. The Out-patient Department.
9. The Laboratory.
10. The Dark Room.
11. The Care of Stores, Medical and otherwise.
12. Fire and Collision Stations.
13. A Method of Man-Handling a Patient.
14. A good Carrying Stretcher.
15. Enemy Patients.
16. The Disinfection of Effects.
17. The Fresh Water Problem.

CHAPTER VI.

THE STAFF, MEDICAL AND SURGICAL (ALLOCATION OF DUTIES).

THE Staff is made up as follows :—

Senior Medical Officer	1
Surgeons	6
Dental Surgeon	1
Chaplain	1
Nursing Sisters	4
Royal Naval Sick Berth Staff	16
Auxiliary Royal Naval Sick Berth Staff	32
Total	61

The Medical Officers.—

1. DISTRIBUTION OF THE MEDICAL OFFICERS.

Senior Medical Officer	Administration.
Staff Surgeon in charge of	Operating theatre. Operation ward. Surgical officer patients.
Surgeon in charge of	Non-operative surgical ward. Intravenous injection of galyl. *X* ray work. Acts as anæsthetist (1 day in 3).
Surgeon in charge of	Medical officer patients. Medical ward. Eye, throat, and ear cases.
Surgeon in charge of	Medical ward. Skin cases. Acts as anæsthetist (1 day in 3).
Surgeon in charge of	Infectious and mental wards. Venereal ward. Medical staff and ship's company. Transport duties.
Surgeon in charge of	Tuberculosis cases. Laboratory. Acts as anæsthetist (1 day in 3).

In distributing the staff, each surgeon's special interests should be considered. Having now served in three hospital ships, experience has shown that one operating surgeon for a hospital ship of 250 beds is preferable to two, for the following reasons: (*a*) It enables a single technique to be carried out in the operating theatre, which tends to efficiency where space is limited; further, the operative work is insufficient for two surgeons. Even after the Jutland Naval Battle it was found that cases requiring operative treatment were few in number. They had already received treatment in their ships. (*b*) The work of the nursing staff is considerably increased if there are two operating surgeons, since special watches have to be supplied to two wards instead of one (see also page 74).

2. DUTIES OF THE MEDICAL OFFICERS.

9.0 a.m.—Meet in 'duty cabin.'

The wards are then visited, and again at 6.0 p.m.

The transport surgeon is permanently on duty. He admits the cases, goes the meal rounds, and a round after midnight. At 9.0 p.m., accompanied by a ship's officer, he goes the rounds to see that all day circuit lights are out and that patients are in their cots.

In addition, two emergency surgeons are on duty for the twenty-four hours. The names of the duty surgeons are exhibited on a notice-board in the ward-room forward and in the 'duty cabin' aft (see *Appendix I*).

The Nursing Sisters.

1. DISTRIBUTION OF THE NURSING SISTERS.

Senior nursing sister ..	For officer patients and medical ward.
Nursing sister	For operating theatre and surgical ward.
Nursing sister	For medical ward and non-operative surgical ward.
Nursing sister	For night duty.

They are responsible for temperatures, medicines, and all treatment and condition of patients.

2. Day and Night Routine for the Nursing Sisters.

Day Duty.

7.45	a.m.	Receive night sister's report.
8.0	a.m.	On duty.
1.0	p.m.	Relieved by afternoon duty sister.
5.0	p.m.	On duty.
8.0	p.m.	Report to night duty sister.

(Afternoon duty every third day, 1.0 p.m. to 5.0 p.m.)

2.0	p.m.	Visit all wards.
4.0	p.m.	Tea round officers' wards.
4.30	p.m.	Tea round other wards.

Night Duty.

8.0	p.m.	Receive day sister's report.
8.15	p.m.	Visit wards.
9.0	p.m.	Medical officer's rounds.
10.0	p.m.	Visit all wards 2-hourly during the night.

(On night duty for one month).

Sick Berth Staff and Naval Ratings.

Sick Berth Staff :—		
Wardmaster	1	
S.B. Stewards, 1st class	5	
S.B. Stewards, 2nd class	5	
S.B. Attendants	5	16
Auxiliary S.B. Staff :—		
Reserve Wardmaster	1	
Attendants	31	32
Naval Ratings :—		
Master-at-Arms	1	
Ship's Corporals	2	
Yeoman of Signals	1	
Chief Writer	1	
3rd Writer	1	
Chief Shipwright	1	
Shipwright	2	
Carpenter's Crew	2	
Plumber	1	12
Total		60

1. DISTRIBUTION OF SICK BERTH STAFF AND EXTRA NAVAL COMPLEMENT.

Administration[1]	1 Wardmaster. 1 Chief S.B. Steward. 2 S.B. Reserves.
Embarkation and Disembarkation ..	1 Reserve Wardmaster. 2 S.B. Reserves.
Baggage	1 Ship's Corporal. 1 Sick Berth Reserve.
Gangway	Master-at Arms.
Wards	34 S.B. Ratings.
Stores	1 S.B. Reserve.
Operating theatre[2] ..	1 S.B. Attendant.
X-ray room	1 S.B. Steward.
Dental room	1 S.B. Reserve.
Dispensary	1 S.B. Steward.
Laboratory	1 S.B. Steward.
Ophthalmic room[3] ..	1 S.B. Steward.

To enable me to know the exact distribution of my sick berth staff at any particular moment, a 'nursing staff register' was instituted (*Fig.* 4). Upon the left are the names of the members of the staff, and upon the right a series of vertical parallel columns ruled into squares. Each column is labelled above with a definite part of the ship or some particular duty. A Moore's push-pin is inserted in a square opposite a name denoting where that person is employed, e.g., it will be seen that Gregory J. T. works in D ward, also in the operating theatre, while Whiting W. is on night duty.

Further, in times of stress, when special watches are perhaps suddenly required, I have been able at a glance to see who is in the different wards. Knowing how busy each ward may or may not be, I am able to decide quickly where the man or men necessary to deal with the emergency can be obtained. This register is kept scrupulously up to date.

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[1] The reserve wardmaster is responsible for the labels, and also for the production of the required number of copies of the alphabetical nominal list for disembarkation.

[2] In addition, two S.B. stewards assist at all operations, as well as being in charge of surgical wards.

[3] This sick berth steward is also in charge of a ward.

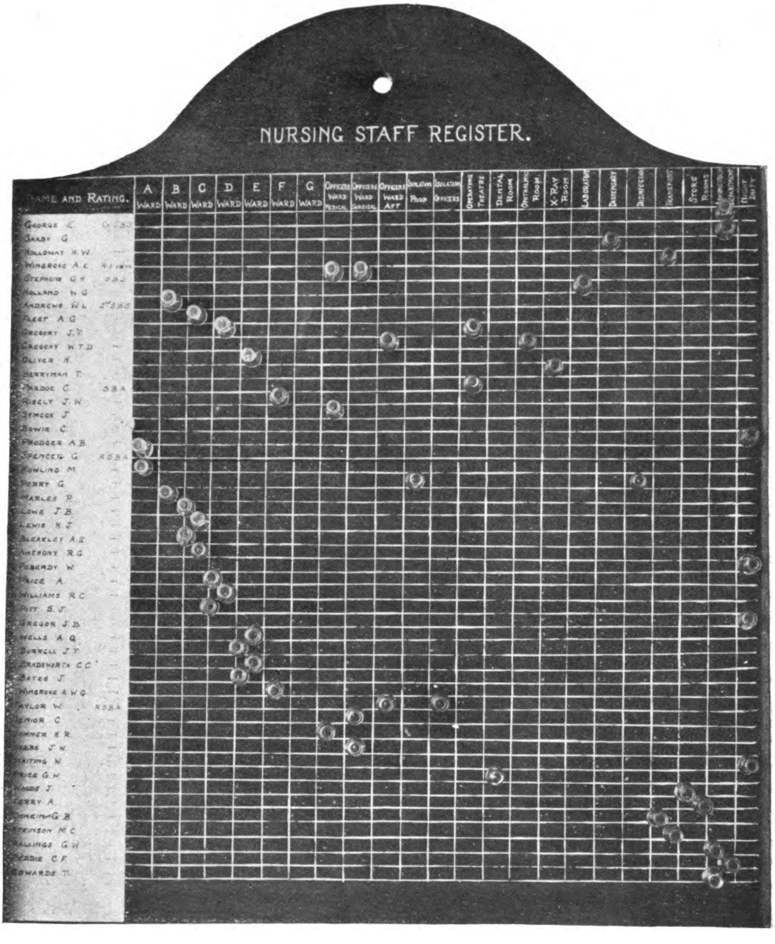


Fig. 4.—THE 'NURSING STAFF REGISTER,' for showing the exact distribution of all the members of the staff at any particular moment.

2. ROUTINE FOR SICK BERTH STAFF.

Day Duty.

6.0 a.m.	..	Turn out, wash and dress.
6.30 a.m.	..	Duty in the wards.
7.0 to 7.30	..	Breakfast.
12.0 to 12.30		Dinner-hour for patrols.
12.30 to 1.30		Dinner-hour for the rest of staff.

Day Duty.

1.30 p.m. ..	Duty in the wards.
3.30 p.m. ..	Tea for patrols.
4.0 p.m. ..	Tea for the rest of staff.
4.30 p.m. ..	Duty in wards.
7.0 p.m. ..	Supper for patrols.
7.30 p.m. ..	Supper for the rest of staff.
8.0 p.m. ..	Duty in the wards.
9.0 p.m. ..	Night rounds.
10.0 p.m. ..	Turn in and lights out.

Night Duty.

8.45 p.m. ..	Night duty men muster at the 'duty cabin.'
9.0 p.m. ..	Take over orders from day-duty men.
7.30 to 8.0 a.m.	Breakfast for night-duty men.
12 noon ..	Light dinner.
1.0 p.m. ..	Turn in.
7.0 p.m. ..	Turn out.
7.30 p.m. ..	Dinner for night-duty men.

(On night duty for one month.)

3. The Organization of the Duties of the Sick-Berth Staff. The Scheme employed in a Large Ward.

Sick-Berth Steward, 1st Class.

Musters the sick berth staff of his ward.

Gets the bed tickets ready for the surgeon's morning visit.

Superintends the dieting, and sees that each patient gets his proper diet.

Attends at dressings.

Must be present at all meals to report to the medical officer doing the meal rounds.

Sees that patients are in bed.

Sees that lights are out.

Is responsible for the condition of bed linen and body linen (assisted by two sick-berth attendants).

Sees that the sick-berth staff perform their duties.

Details, in rotation, one sick-berth auxiliary attendant who is to attend at all dressings.

Sick-Berth Steward, 2nd Class.

To assist at dressings.

To do non-sister's dressings.
Prepare skin of operation cases.
To be responsible for all operation cases being taken to and from the theatre.
To do bed-making (non-sister's cases), assisted by two sick-berth attendants.
To supervise the sick-berth attendants' routine work, and to be responsible that they do it.

Four Sick-Berth Attendants, whose Duties are divided into Four Sections (A.B.C.D.):—

a. Sick-Berth Attendant to be responsible for Section *A*, i.e.,
  Lavatories.
  Bathrooms.
  Scuttles.
Every morning:—
  Clean scuttles (glass and bright work) before 9.0 a.m.
  Flush and disinfect all pans.
  Scrub lavatory floor.
Three times daily: Flush and disinfect the hoppers.
Friday: Wash paint-work in the lavatories and bathrooms.
Every fourth Saturday forenoon: Scrub canvas stretchers.

b. Sick-Berth Attendant to be responsible for Section *B*, i.e., port side half of the ward, with half the beds.
Every morning: Dust roof, walls, stanchions, and beds. Wash paint-work under ports.
Monday, Wednesday, and Saturday mornings: Scrub floor of port side of ward.
Friday morning: Wash paint-work of sides of ward and stanchions. Wash rafters. Take life-belts down and brush them.
Every fourth Saturday forenoon: Scrub canvas stretchers.

c. Sick-Berth Attendant to be responsible for Section *C*, i.e., starboard side half of ward with half the beds.
Every morning: Dust roof, walls, stanchions, beds, and lockers. Wash paint-work under the ports.
Monday, Wednesday, and Saturday mornings: Wash

paint-work of stanchions, lockers, and sides of ward. Wash rafters. Take life-belts down and brush them.

Every fourth Saturday forenoon: Scrub canvas stretchers.

d. Sick-Berth Attendant to be responsible for Section *D*, i.e.,

Annexes to ward.
Hatchway in centre of the ward.
The lift.

Every morning: Clean and disinfect feeders, spit-pots, bed-pans, goosenecks. Scrub out annexes. Dust shelves and paint-work of the annexes. Clean and test the lift.

Monday, Wednesday, and Saturday: Scrub hatchway in the centre of the ward.

Every fourth Saturday forenoon: Scrub canvas stretchers.

CHAPTER VII.

EMBARKATION ROUTINE.

To the uninitiated, the paramount necessity for a well-thought-out routine for embarkation and disembarkation is perhaps not obtrusively evident. It must, however, be realized that an outstanding characteristic of the hospital ship, as compared with other hospitals, is the constant liability to the admission or discharge of patients in mass, together with special difficulties in transportation. Consequently, an arrangement is necessary which will permit these operations to be carried out rapidly, quietly, and without confusion, and its exceptional importance in war time, when requirements are increased and speed may be vital, need not be emphasized. It is for these reasons that the scheme worked out in the following paragraphs, which has been found in practice to work admirably, is described minutely, even to the inclusion of details apparently trivial.

A successful embarkation routine is one which aims at the prompt and comfortable transference of a patient, from the vessel bringing that patient, to his bed in the hospital ship.

A patient is admitted either as a walking case or a cot case. If the former, he walks up the ship's gangway; if the latter, a wooden tray (called a cot carrier) is used for hoisting him inboard.

For description of the embarkation, the method can conveniently be divided into four sub-sections: (*A*) *Means of getting the patient* (*a cot case*) *inboard;* (*B*) *Allocation of his bed;* (*C*) *Registering the occupation of that bed;* (*D*) *Stowage of his effects.*

A. **Means of Getting the Patient Inboard.**

Getting a Cot Case Inboard.—Many appliances are employed on board ship for the transference of the sick and wounded, either from ship to ship, or ship to shore. A patient unable to walk, i.e., a 'cot case,' arrives in a canvas cot (*Fig.* 5) and remains in this until his new bed is reached. This canvas cot consists of a wooden framework measuring 5 ft. 11 in. × 2 ft. 5 in. The breadth of the wood of the frame is 4 in., with a thickness of 1¼ in.

Round the frame is fitted No. 1 stout canvas, with sides 3 ft. 2 in. in breadth, which entirely cover the patient and bedding. The ends are a foot high, and a transverse batten is sewn in for strengthening purposes. From here the canvas is brought to a point 14 in. from the batten, and is fitted with an eyelet which can be used for hoisting the cot for a short distance. Eyelet holes are also fitted at the ends and beneath both battens, through which a small loop of rope is spliced for carrying purposes. A covering of canvas is laced over the frame, and the mattress and bedding are placed on this frame. The wooden framework, therefore, is covered by two layers of canvas, one being on its under and the other on its upper surface.

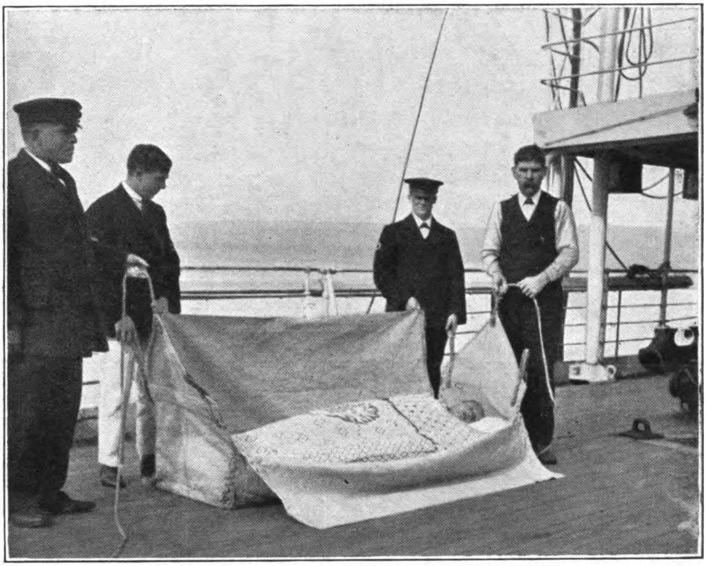


Fig. 5.—The Canvas Cot.

The Cot Carrier.—The appliance for hoisting the canvas cot on board is known as the '*cot carrier*' (*Figs.* 6–8). This consists of a stout wooden tray measuring 9 ft. long × 3 ft. wide, and sides 1 ft. high. It is suspended by four wire slings. Fitted into the bottom of the tray are three transverse teak-wood rollers, one in the middle and one at each end; both tail-boards fit into slots and are removable, which enables a canvas cot to

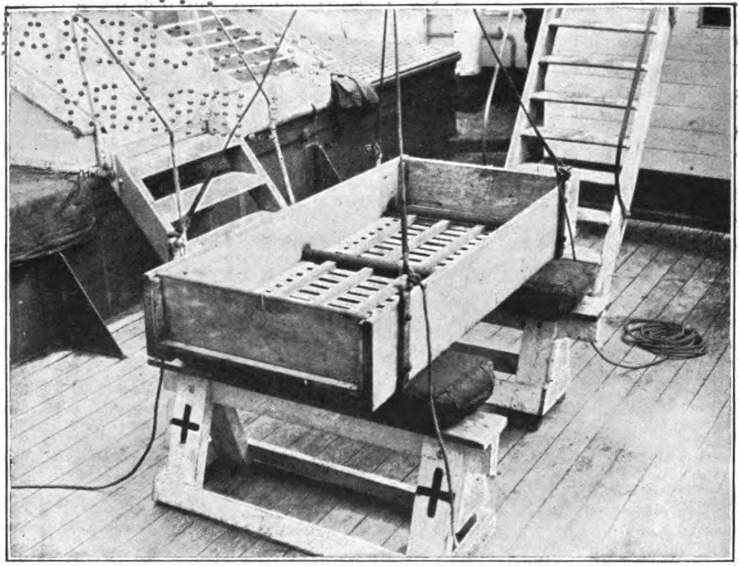


Fig. 6.—The Cot Carrier.

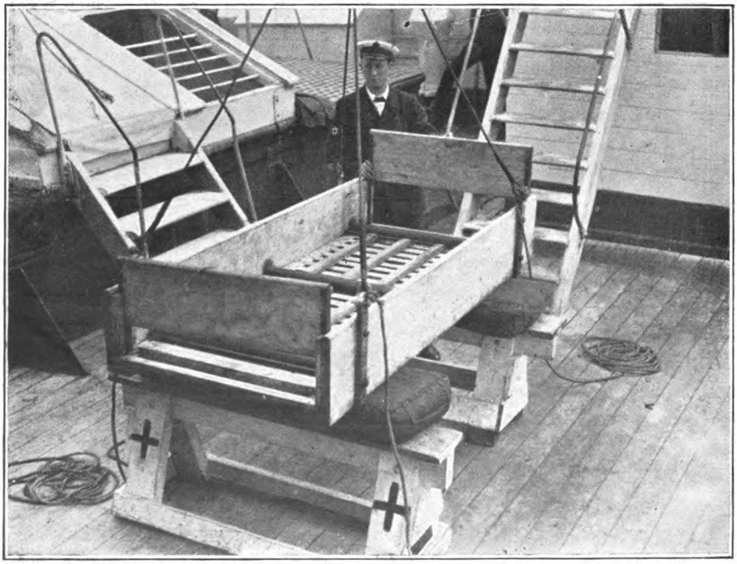


Fig. 7.—The Cot Carrier with ends raised.

be run into the tray readily (*Fig.* 7). This admirable improvement upon the official cot carrier was designed by Captain E. W. de W. Bruce, in command of the hospital ship *Plassy*. If the hospital ship is fitted with good steam winches, the cot carrier can be hoisted in and out with considerable rapidity. It is important that the cot carrier should have guiding ropes

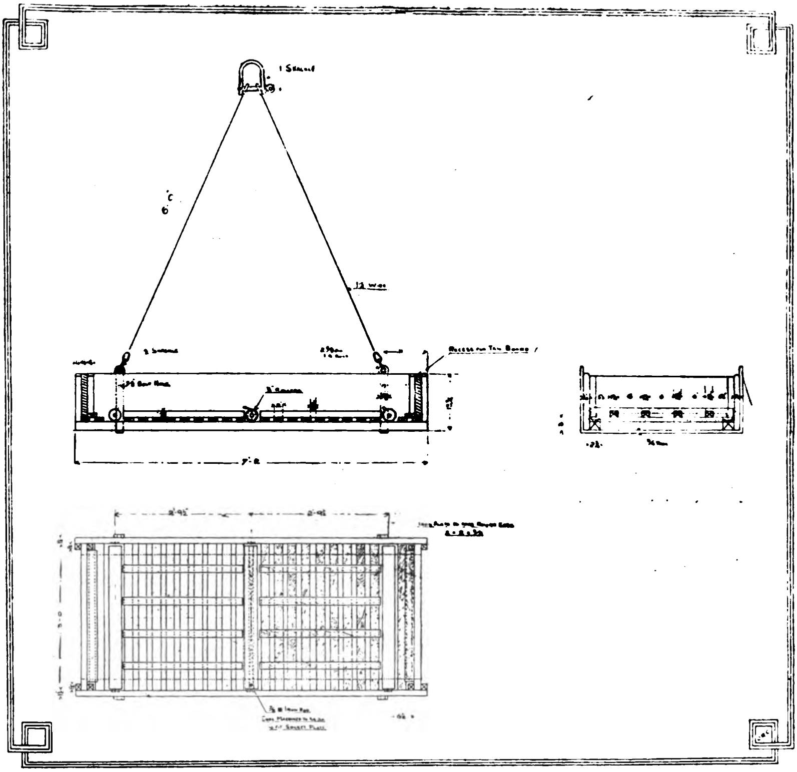


Fig. 8.—PLAN OF COT CARRIER. (Scale 1 in. to 1 ft.)

attached in order to steady it. Cushioned trestles receive the tray both inboard and outboard. When the cot has been placed in it, the cot carrier is hoisted inboard, and after allocation of a bed by the transport officer, the patient is admitted to the ward. In the early part of the commission the patient reached the ward via the lift, which was worked by a hand-winch, and had the great disadvantage that it was very slow working, and was therefore a source of delay in both the embarkation and the disembarkation of patients. So much was this the case that it was found necessary to entirely give up using them when any considerable number of cot cases were being taken in or discharged. As a substitute, the hatches were removed, the cot carrier was lowered on to the main deck, and the cases were hoisted straight out. This method saves a great deal of time, and has been very satisfactory. It also liberates four of the nursing staff who otherwise would be employed working the winches. An electric lift has the advantage of being much quicker and requiring only one man to work it, but its installation would occupy a considerable time.

A Use of the Ship's Boat in Embarkation.—If the ship's boats are used for the embarkation of cot cases, the whole boat, with cots, can be hoisted. By this means cot cases may be embarked very quickly.

With regard to the transhipment of patients in a rough sea, I do not think this practicable. Even when there has been a small roll on, with the ship lying at anchor, it has sometimes been found extremely difficult and dangerous to get patients on board.

B. Allocation of a Patient's Bed.

To facilitate the admission of a patient with the greatest possible promptitude, the following arrangement has been devised :—

Admission Board.—The beds of each ward are indicated on a large wooden tablet, called the 'admission board,' kept in the 'duty cabin' (see *Fig.* 9). The letter name of the ward is on the top, and the beds are numbered below consecutively. Just above each number a brass hook is screwed into the wood ; on this hook hangs a brass token about the size of a penny. This token is perforated near the top to enable it to be suspended, while on its centre is stamped the letter name of the ward, with the number of the bed it is covering on the admission board.

In *Fig.* 9 four tokens are seen to be absent, and are replaced by celluloid discs, which indicates that four beds are occupied, Nos. 9, 14, 20, and 24. The four tokens have been transferred to the ward board (see *Fig.* 10).

The presence of a token on this admission board is an indication that the bed is unoccupied, and when it is absent and replaced by the celluloid disc shown in the photograph (the purport of which is explained later on, p. 67), it means that the bed has been filled.

Fracture Cases.—If the cot is a fracture cot, that is to say, larger than the ordinary cot, to allow room for splints and extension apparatus, the letter F is painted on the tablet near the number.

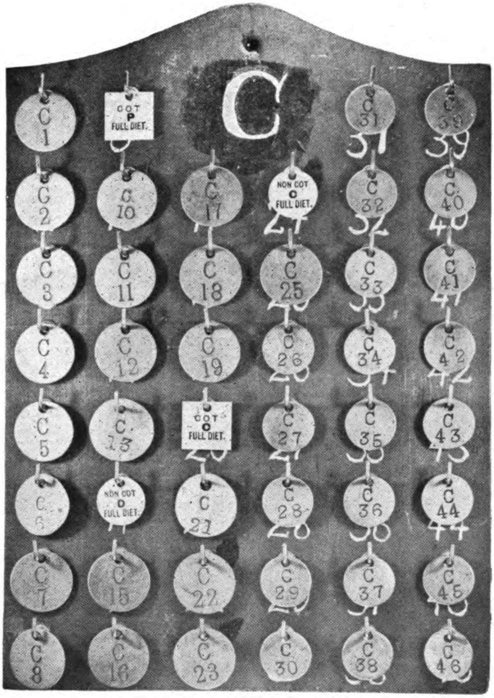


Fig. 9.—ADMISSION BOARD FOR A WARD, showing the Brass Tokens.

After the patient's arrival in the ship the transport officer gives directions as to the ward he is to occupy, and on arrival in the ward a bed is selected in accordance with the nature and severity of the disease or injury. In the surgeon's office (adjoining each ward) is a board giving a plan of the deck space of that ward (see *Fig.* 10), showing the position of all the beds and their numbers with brass hooks, similar to the admission boards.

When a patient is admitted to a ward, the steward in charge fills up, at once, a small form called the 'next-of-kin' chit, which has printed upon it the following :—

Ward Bed Date
Name
Age
Rating
Ship
Depôt and official number
Injury or disease
Degree
Condition
Diet
Cash and valuables
Religion
Next-of-kin

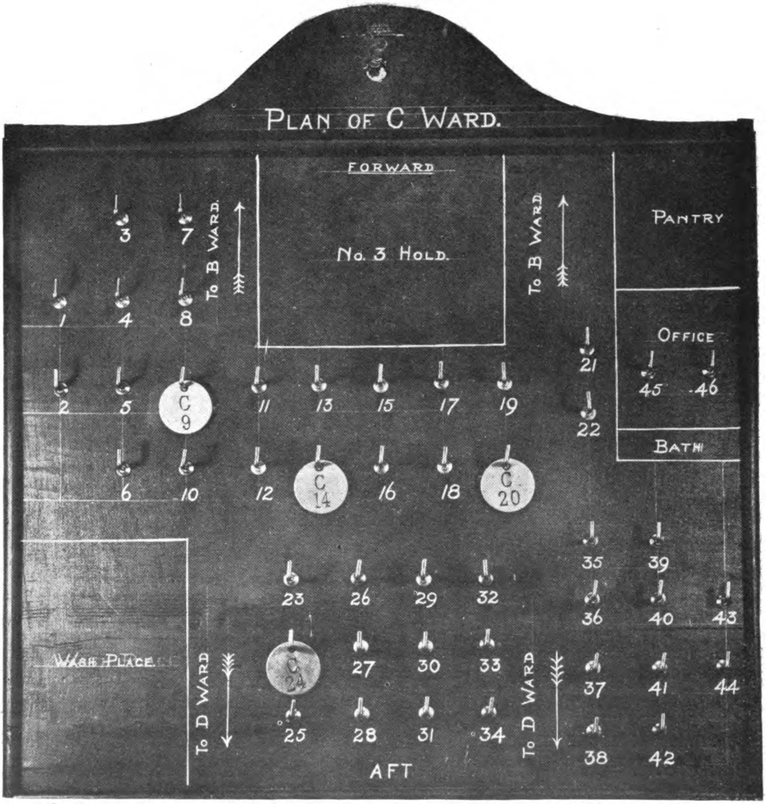


Fig. 10.—Ward Board, showing the Brass Tokens Nos. 9, 14, 20, and 24, which have been transferred from the admission board, indicating that four beds are occupied in the ward.

As soon as these particulars are obtained, the steward takes the chit to the 'duty cabin,' and in exchange obtains the brass token corresponding to the ward and number of bed occupied, which is forthwith hung up on the board in the surgeon's office. It remains until the patient is discharged, when it is returned to the 'duty cabin,' together with the patient's bed ticket. The token is then hung up in its proper place on the admission board to indicate that the bed is available for a further patient. Everybody is thus able to see at a glance the occupied and unoccupied beds.

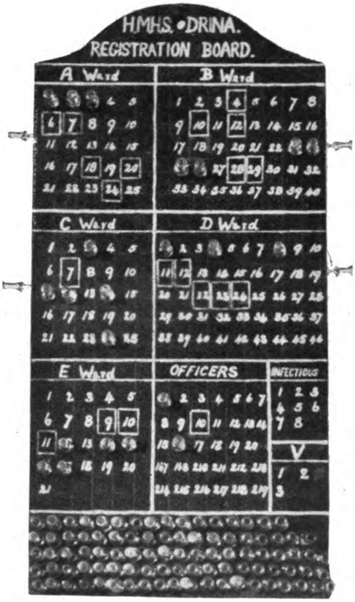


Fig. 11.—Registration Board. The pins that are not already covering numbers are seen ready for use below.

C. Registering the Occupation of the Bed.

Registration Board.—In order that the actual number of patients *in hospital* can be seen at a glance, a 'registration board' is kept. This is another wooden tablet, measuring 18 in. × 10 in., and painted black. On it is a separate division for each ward with its beds numbered consecutively (*Fig.* 11). When all the patients have been admitted, the wardmaster indicates the actual beds that have been filled by covering the number of each occupied bed on the board with a 'Moore's push-pin' (a glass-headed sharp-pointed pin). When the patient is discharged, the pin is removed to show that the bed is vacant. By means of the registration board, anyone can see at a glance how many beds are occupied and unoccupied in each ward, and also in the whole ship; further, it acts as a check to the admission boards. Again, it shows the position of the fracture beds, which are longer and broader than the ordinary cots, in order to allow room for splinting and an extension apparatus. The ordinary cots measure 6 ft. 2 in. × 2 ft. 7 in., as compared with the 7 ft. 2 in. × 3 ft. 1 in. of the fracture cots, and the latter are shown on the registration board by means of a square painted in white round the number.

D. Stowage of the Patient's Effects.

Every man on admission is supplied with a hospital uniform. His own clothes are mustered, tied up into a bundle, labelled, and handed over to the ship's corporal in charge of the baggage store, with a list of the contents of the bundle. Paper tallies, complete with string, corresponding to each bed are always kept ready in the ward for the purpose on the admission of patients. When a man is sent to hospital from his ship, Article 1302 King's Regulations and Admiralty Instructions lay down the following routine :—

> The patient's effects are to be carefully stowed in bags or other receptacles, which are to be labelled and sealed in a similar manner to a mail bag, the mail seal issued to His Majesty's ships being used for that purpose. The label is to be signed by the person who enters the effects on the sick voucher and by the responsible officer.

The baggage and bedding, thus sealed, are stowed in the baggage room in the compartment corresponding to the ward and number of bed occupied by the patient. Should the owner wish to open his bag he must break the seal in the presence of the ship's corporal in charge of baggage.

Valuables.—These are deposited in the safe, being first entered in a book for the purpose and signed by the depositor. A record of this is also kept in a special column in the in-patient register.

CHAPTER VIII.

DISEMBARKATION ROUTINE.

Disembarkation implies not only the landing or removal of patients, but also of their baggage and the necessary service documents.

The important points in a good disembarkation scheme are: (1) *Rapidity;* (2) *Decentralization,* by which is meant that the different branches of the work are subdivided into separate and distinct units, although each unit is supervised by, and hands the final results of its work to, the senior medical officer; (3) *Absence of fuss.* If the first two are efficiently attained, the third automatically follows.

Clerical Work Required.—The following forms, etc., which entail a good deal of clerical work, are prepared on the discharge of patients:—

a. An alphabetical list.
b. A baggage abstract.
c. Labels for each patient.
d. The medical case sheet. Admiralty Form M. 188.
e. The medical history sheet. Admiralty Form M. 190.
f. The sick voucher. Admiralty Form S. 47.
g. The hospital entry and discharge. Admiralty Form S. 579.
h. An intimation to both depôt and ship of the man's arrival and subsequent disposal, with dates.
i. A money and valuable list.
j. The list of cases requiring special attention during the journey.

I will now describe in detail the meaning of the forms, etc., mentioned in the foregoing list, together with the object of the labels:—

a. **The Alphabetical List** is a complete list of all the patients, officers and men, cot and non-cot, who are being discharged; these names should be arranged in alphabetical order. This list describes their rank or rating, the ship they belong to, their disease, and their effects (see *Appendix II*). It is required in order that the number of patients may be checked by the receiving medical officers in charge.

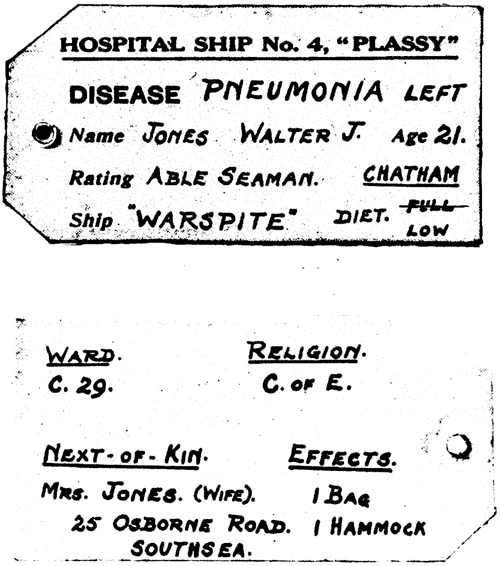
Four copies are necessary : (*a*) One for the hospital ship, for checking the patients as they pass down into the water transport (or, if the ship is unloading alongside a wharf, as they leave the ship for the motor transport or train) ; this is also required as a reference for the future ; (*b*) One for the officer in charge of the water or motor transport ; (*c*) One for the officer in charge of the ambulance train ; and (*d*) The officer in charge of the base hospital, the patient's ultimate destination, also requires a copy.

The Patients to be Sorted into their Respective Divisions.—Naval ratings are recruited mainly through three depots, viz., Portsmouth, Chatham, and Devonport, and a very large proportion of the men belong to the neighbourhood of these three areas. For administrative convenience, and also for that of the patients, it was found desirable that sick and wounded from the fleet should be disembarked direct from the hospital ship to the hospital of their depôt. To be compelled to ascertain correctly, at a moment's notice, the number of patients on board (with a full ship) belonging to various depôts is by no means an easy matter. In order, therefore, to have this information constantly ready to hand, the following scheme was adopted :—

Celluloid discs (to which reference has already been made on p. 51) were obtained with the letter P (Portsmouth), C (Chatham), or D (Devonport) printed on them. After each patient is admitted, a disc corresponding to the depôt to which he belongs replaces on the admission board (see *Fig.* 9) the brass token, which is transferred to the ward board (see *Fig.* 10). In this way a bird's-eye view is obtained of the number of patients belonging to any particular depôt, at any time and in any ward. These discs also subserve other purposes, and are referred to in further detail later (see p. 67).

b. **The Baggage Abstract** is a short summarized statement of the different varieties of baggage despatched to each depôt. The baggage of the bluejacket consists of a brown canvas bag and a hammock, but the chief petty officer, officer's steward, cooks (1st class), and confirmed sergeant of marines, are allowed by regulation to have a clothes chest measuring 3 ft. 2 in. × 1 ft. 10 in. × 1 ft. 10 in.

c. **Labels for each Patient.**—A stout linen label is affixed to each patient, stating the disease he is suffering from, his name, official number, age, rating, and ship; also his diet (full or low) on leaving the ship, for convenience of cooking arrangements on the hospital train. The label is distinctively shaped as a guide to the depôt to which the man belongs, and the name of the depôt is printed on the label. The reverse of the label gives the man's religion, the ward, and the number of the bed he occupies in the hospital ship, the address of his next-of-kin, and his effects (see *Fig.* 12). The value of this information has already been proved; a patient died suddenly whilst on passage for a Southern hospital, and from the label attached to him, all particulars were immediately obtainable for notifying relatives, etc.



HOSPITAL SHIP No. 4, "PLASSY"

DISEASE PNEUMONIA LEFT
Name JONES WALTER J. Age 21.
Rating ABLE SEAMAN. CHATHAM
Ship "WARSPITE" DIET. ~~FULL~~ LOW

WARD. RELIGION.
C. 29. C. of E.

NEXT-OF-KIN. EFFECTS.
MRS. JONES. (WIFE). 1 BAG
25 OSBORNE ROAD. 1 HAMMOCK
SOUTHSEA.

Fig. 12.—LINEN LABEL (showing both sides) affixed to each patient previous to disembarkation.

d. **The Medical Case Sheet.**—M. 188 is a form upon which is entered a detailed account of the illness of an officer or man on his discharge to hospital. The document relates to that illness only, and accompanies the patient to the base hospital, notes as to the progress of the case being entered by each medical officer responsible for his care while on passage (*Appendix III*).

e. **The Medical History Sheet.**—M. 190 is a record of the health of a man throughout his career in the service (*Appendix IV*). It is provided on entry to the service, and returned to the Admiralty when he is finally discharged from the service, or if he should die. The details of the illness are entered by the senior medical officer, and the documents are kept under lock and key in a cupboard specially provided for the purpose.

The medical history sheet accompanies the man wherever he goes, and for that reason it is kept with his service certificate ; on joining a ship or naval establishment it is handed over to the medical officer.

f. **The Sick Voucher.**—S. 47 is a form which provides the following information with regard to the patient : his ship, his number on the ship's book, his port or marine division, official or regimental number, name, rank or rating, disease or hurt, name and address of nearest relative or friend, religious denomination, amount of allotment, the inclusive date to which his victualling is adjusted. The time of quitting the ship and arrival at hospital has to be stated for the purpose of arranging the victualling in ship or hospital respectively. The medical officer who attended the man signs it. On the other side of the form the list of effects belonging to the patient is given in detail (*Appendix V*).

g. **The Hospital Entry and Discharge.**—S. 579. This form (the accountant officer's form) enables the depôt authorities to know the whereabouts of any rating after he has been discharged sick.

In the case of a man being discharged to a hospital ship the hospital entry and discharge accompanies him, but his non-medical papers (service certificates, etc.) are sent to his depôt. The pay and victualling are claimed in the ledger of his ship if he is discharged after the hour of noon, but are accounted for in the hospital if he leaves his ship in the forenoon (*Appendix VI*).

h. **An Intimation to both Depôt and Ship of the Man's Arrival and Subsequent Disposal, with Dates.**—The man's depôt has to be informed (A.W.O., No. 95, of January 22, 1915) of his arrival and disposal, with dates (*Appendix VII*). For the convenience of the patient's ship, similar information is forwarded to the commanding officer (*Appendix VIII*).

i. **The Money and Valuables List.**—A list of the money and valuables deposited by the patient for safe keeping in the hospital ship (*Appendix IX*). A duplicate list accompanies the valuables to the shore hospital.

j. **The List of Cases requiring Special Attention during the Journey** (*Appendix X*).—The cases requiring special attention during the journey to the base hospital are also shown on the admission boards by the system of celluloid discs already mentioned, and described in detail later (see p. 67).

With such a mass of detail required in connection with each patient who leaves the ship, it becomes necessary to devise a scheme by means of which these documents can be completed with the least possible delay. A hasty emptying of the ship is the rule rather than the exception.

How the Alphabetical and Baggage Lists are quickly made out.—The first and third items mentioned above, i.e., (*a*) the alphabetical list and (*c*) the labels, concern that portion of a disembarkation which ordinarily entails a great deal of labour and takes up much valuable time: (*a*) depends entirely on (*c*) being kept up-to-date, and on their being kept sorted in strict alphabetical order according to their depôts. This sorting is religiously done each morning, so that the disembarkation lists can be written up, when they are required, with great rapidity.

The labels are written up on the admission of the patient, and when completed are at once hung up on their respective ‘ label boards ’ (*Figs.* 13–15). These label boards measure 3 ft. × 1 ft., and the letters of the alphabet are painted on in two rows. Immediately below the letter is a long, thin, sharp-pointed nail ($2\frac{1}{4}$ in. long), slightly bent upwards at the end, on which are hung the labels in accurate alphabetical order corresponding to the name of the patient. The upturned free end of the peg prevents these from falling off. When the alphabetical and baggage lists are to be written out the details are obtained from the labels.

Cases Leaving the Hospital Ship.—The points *a* to *j* having all been completed, the patient is ready to leave the ship. The cot cases are lowered first into the water transport, or on to the quay if the ship goes alongside, and checked from the alphabetical list. Non-cot cases are fallen in at the gangway, and no one is allowed to pass down the ladder-way until his name has been

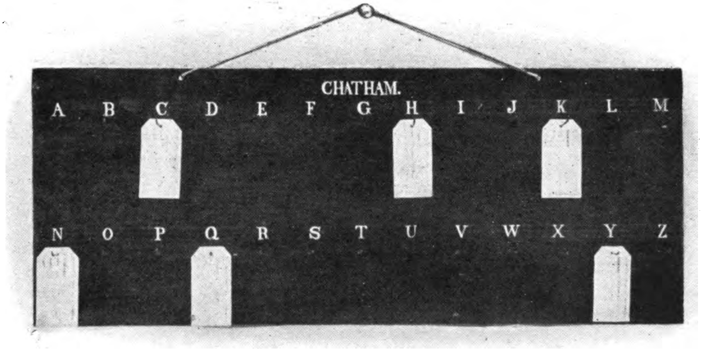


Fig. 13.

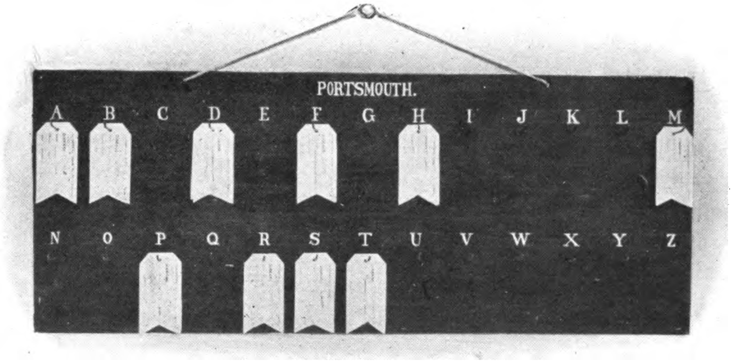


Fig. 14.

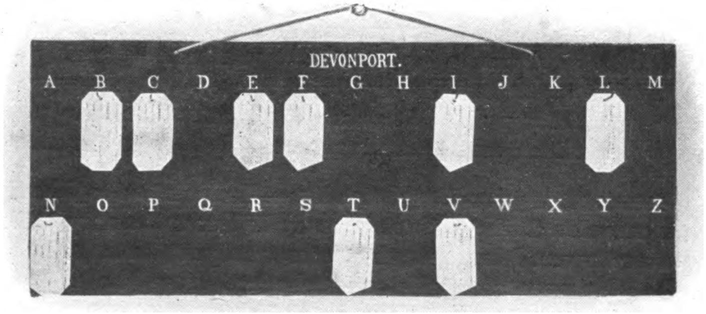


Fig. 15.

Figs 13, 14, 15.—The Label Boards.

checked. This is an important detail, for during a disembarkation at the beginning of the commission a patient was left behind after the tug had cast off, and considerable delay was thereby caused. Baggage is checked and passed into the water transport, or on to the quay, before the patients leave the hospital ship.

With regard to the disembarkation of patients, however efficient the organization may seem, there are pitfalls which may be encountered. The following experience is a good example :—

An order for immediate disembarkation was received ; forty non-cot cases were discharged ; but, owing to limited accommodation on shore at the time, the patients were split up into four batches. Each man was labelled, and the disembarkation routine carried out as already described. In the rush no note was taken on shore of the labels, which are a ready guide for the diseases the patients are suffering from, and ten cases of venereal disease were sent to a private hospital. The hospital ship was *not* to blame.

Information Required for the Ambulance Train.—The medical officer in charge of an ambulance train requires the following information about all patients he is to receive from a hospital ship :—

a. The depôt to which the patient belongs.
b. Whether he is a cot or a non-cot case.
c. Whether he is on full or low diet.
d. If he will require special attention, such as dressings, during his journey in the ambulance train.
e. Whether he is a mental case.

The method adopted for obtaining this information with as little delay and trouble as possible is by utilizing the admission boards and the special celluloid discs already referred to (pp. 57, 62). These replace the brass token, which is transferred to the ward board on the admission of the patient, and denotes the bed that he is to occupy (*Fig.* 10).

The following discs are used :—

1. White circular discs marked **P** (Portsmouth)
2. ,, ,, ,, ,, **C** (Chatham)
3. ,, ,, ,, ,, **D** (Devonport)
4. Red ,, ,, ,, **P**
5. ,, ,, ,, ,, **C**
6. ,, ,, ,, ,, **D**
7. White square ,, ,, **P**
8. ,, ,, ,, ,, **C**
9. ,, ,, ,, ,, **D**

10. Red square discs marked P
11. ,, ,, ,, ,, C
12. ,, ,, ,, ,, D
13. Green circular ,, ,, P
14. ,, ,, ,, ,, C
15. ,, ,, ,, ,, D
16. ,, square ,, ,, P
17. ,, ,, ,, ,, C
18. ,, ,, ,, ,, D
19. ,, circular ,, ,, P AND MENTAL
20. ,, ,, ,, ,, C ,,
21. ,, ,, ,, ,, D ,,
22. ,, square ,, ,, P ,,
23. ,, ,, ,, ,, C ,,
24. ,, ,, ,, ,, D ,,
25. White circular Duty
26. ,, ,, Remaining in hospital

Note.—The letters denote the depôts (paragraph *a*):—P. = Portsmouth. C. = Chatham. D. = Devonport
The shape of the discs denotes cot or non-cot (paragraph *b*):—Square = cot. Circular = non-cot
The colour of the discs denote:—
1. The diet (paragraph *c*): White = full diet. Red = low diet
2. Cases requiring special attention (paragraph *d*):—Green,
3. Mental cases (paragraph *e*):—Green with 'mental' printed on them.

It is thus seen that if a patient has a white circular disc marked with the letter P hung up on the peg on the admission board, his depôt is Portsmouth, he is on full diet, and he is a non-cot case. If the disc is red and square the patient is on low diet and is a cot case. If a green disc, the patient will require special attention, and low or full diet, as the case may be, is printed on the disc.

Before discharging cases to an ambulance train, a telegram in detail has to be sent to the Admiralty, stating the particulars already mentioned in paragraphs (*a*) to (*e*); these particulars are accurately obtained by counting up the different varieties of discs in a few seconds. The latter point is an important one if a sudden disembarkation were necessary. The following is a specimen telegram:—

> "From hospital ship *Drina* to Navy Medical, London.
>
> Hospital ship *Drina* due Liverpool 9.0 a.m., 6th August, with grand total of 3 officers and 135 men. Details as follows:
>
> *Chatham:*
> Officers, cot 1; non-cot nil.
> Men, cot 10; non-cot 32.
> *Portsmouth:*
> Officers, cot 2; non-cot nil.
> Men, cot 12; non-cot 28.

Plymouth :
Officers, cot nil ; non-cot nil.
Men, cot 16 ; non-cot 37.
Mental Cases (included in above) :
Chatham, men, non-cot 1.
Portsmouth, men, non-cot 1.
Plymouth, men, non-cot 1.
Low Diet :
Officers 2 ; men 16. "

Note.—In sending the actual telegram, the words Officers and men, and cot and non-cot, are omitted. For example: Chatham, 1 nil, 10-32; Portsmouth, 2 nil, 12-28; Plymouth, nil, nil, 16-37.

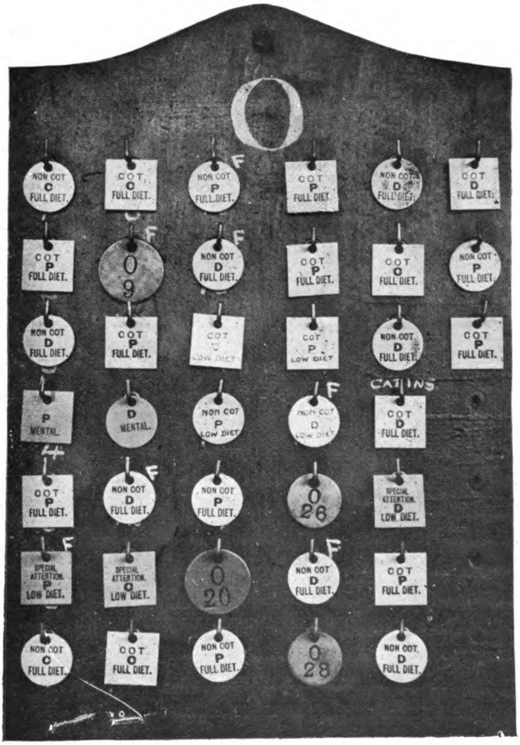


Fig. 16.—Special Celluloid Discs for Obtaining Information required by the Medical Officer of the Ambulance Train.

The discs are kept in a tray, such as is used for storing coins in rouleaux, similar to the naval paymaster's money drawers.

How the Discs are Kept up-to-date.—In order to ensure accuracy with the disc scheme for disembarkation, a Form is employed (*Appendix XI*). It is a statement of the patients of each ward, and as the patients are admitted, they are entered on this list. The form is fixed with drawing-pins to a board the same size, so that it can be easily carried. Each board carries four forms, one for each depôt—Portsmouth, Chatham, and Devonport—and one for non-service men received from auxiliaries. The names of the patients are thus arranged immediately on admission in accordance with the depôts they belong to. In this form the necessary information is handy, easily get-at-able, and capable of being used as an easy reference in the ward, and is an intermediary between the ward, 'the duty cabin,' and the admission board.

It is checked twice a day as follows :—

1. When the senior medical officer makes his morning round it is in the ward for inspection—and enables him to be cognizant of all patients in each ward—those going to duty shortly, and those who will have to be discharged south, that is, to one of the base hospitals. After the morning visit these boards are removed to the 'duty cabin,' where they remain for freshly-admitted cases to be entered on the form.

2. At 6 o'clock the boards are returned to their respective wards, and are carefully revised by the medical officer in charge at his evening round. This ensures accuracy with regard to cot and non-cot cases, full or low diet, etc. As soon as they have been revised they are returned to the 'duty cabin,' and the ward-master must see that they exactly correspond with the disembarkation discs (celluloid).

When patients fit for duty are to be discharged, the surgeon writes the date he is to leave the hospital ship in the column 'Date of discharge.' Everyone concerned is thereby cognizant of the fact, and all arrangements (e.g., entry on Medical History Sheet and Hospital Entry and Discharge (see p. 64), valuables and baggage) are automatically made. As soon as a man is discharged to duty his name is ruled through.

CHAPTER IX.

BOOK ROUTINE.

Reference to patients who have passed through the hospital ship, even at a remote date, are constantly being received, and therefore one of the most important points in the organization is the careful registration of every patient who arrives in the ship, whether he is an in- or an out-patient. The registration must be so arranged that full details of each patient are available immediately.

Separate registration books are kept for in- and out-patients; each book is indexed. The in-patient register necessarily requires more details than the out-patient one.

The names are entered consecutively in the book, and here can be found every particular with regard to the patient. If medical officers come on board, as they frequently do, and want to know any particulars with regard to men admitted, say six months previously, these particulars can be given in the shortest possible space of time. Furthermore, chaplains of all denominations are frequent visitors to the patients, and by going through the in-patient register, which is kept open on the table in the 'duty cabin,' they can find the names, number of bed, and ward of all men they wish to see, since there is a special column denoting the man's religion. By this means they avoid taking up the valuable time of the nursing staff searching for an individual member of their flock. Many chaplains have expressed their satisfaction in regard to this method, as they are able to address a sick man by his name at the bedside instead of having to ask the patient his name.

In-patient Admission Register.—The following facts are registered :—

The number (for indexing purposes).
Whether the medical history sheet has accompanied the patient.
His age, rank, or rating.
Ship.
Number on the ship's book.
His official number.

The date of admission to hospital, whether before noon or after noon.
The date of discharge, whether before noon or after noon.
The number of days he was sick.
His ward, number of bed, and whither discharged.
Whether his injuries were received in action.
If a hurt certificate has been granted.
The disease or injury.
The name of the physician or surgeon under whose care he comes.
The name of the operator (if an operation is necessary)
The operation.
The name of the anæsthetist.
The anæsthetic used.
The *x*-ray report.
The dental report.
How the patient left the ship, whether as a cot or a non-cot case.
His religion.
If he has deposited any cash or valuables for safe custody; the amount, etc.
Remarks.

These facts occupy the two pages when the book is open; its cover measures 1 ft. 7 in. in length and 1 ft. 2 in. in breadth; the book is 2½ in. thick and has 250 pages. If a man is transferred from one ward to another, a second complete entry is made in the register, but in red ink, and it is not renumbered; a note in the remarks column against the original entry refers to date of transfer, and so can be looked up if required.

The Out-patient Register is a smaller book, measuring 1 ft. 2 in. by 10½ in., and is 3 in. thick, with 250 pages. The following headings are necessary:—

The number (for indexing purposes).
The date.
Patient's name, age, rank or rating, and ship.
His number on the ship's book and his official number.
If the injuries were received in action.
The injury or disease.
The surgeon in charge of the case.
The *x*-ray report.
The dental report.
Remarks.

These headings also occupy the two pages when the book is open.

As the books are large, and will hold when completed a very large number of names, it would cause considerable delay to look down long columns of names without some help. The indexing of the register is therefore done as follows : Every page for each letter is divided into five columns. Each column is labelled *a*, *e*, *i*, *o*, *u*, respectively (that is, the common vowels). Each name is entered in the column corresponding to the first vowel in that name, not counting the first letter of the name if this happens to be a vowel. For example :—

Adamson would be in the '*a*' column.
Anderson in the '*e*' column.
Aitcheson in the '*i*' column.

CHAPTER X.

DEPARTMENTAL ORGANIZATION.

Operating Theatre Staff and their Duties.—Only one operating theatre is in permanent commission. I have placed one surgeon in full charge of this theatre, and his staff (which is a permanent one) includes only one other qualified medical man.

When a rush of work comes in, I consider it very necessary to have as many of the doctors as possible available to attend to the cases, which may be arriving in numbers. If in ordinary times one of them helped at all operations, the operator would have to dispense with his skilled assistance when the rush came, for it would be out of the question to immobilize three doctors in one theatre; he (the operator) would be then placed at a disadvantage, inasmuch as his assistant would be new to him. It is better therefore for the operating surgeon to train his assistants (sick-berth stewards) in peaceful times, so that he can absolutely depend upon them in strenuous times. The same staff working together get to know each other's ways, and frequent changes in this staff would *not* conduce to such efficiency.

This plan has acted well in practice, and can be recommended. Should it ever become necessary, the other theatre can be brought into action in a short space of time.

A notice is sent me of any operation which is to be performed (*Appendix XIII*).

The permanent theatre staff consists of six persons:—

1 Operating surgeon.
1 Anæsthetist.
1 Nursing sister.
2 Sick-berth stewards.
1 Theatre attendant.

The duties of this staff are in brief:—

1. The operating surgeon is in charge of the theatre, and is responsible for every detail in it.

2. The theatre sister is responsible for the maintenance and sterilization of everything used (except instruments and gloves).

Before an operation she gets the theatre ready and makes the lotions; during an operation she hands the mops.

3. One steward acts as assistant to the surgeon at operations; he is also responsible for the maintenance and sterilization of surgical instruments and gloves (only). He also assists with the nursing in a surgical ward.

The other steward only attends the theatre for an operation, when he hands the surgical instruments and ligatures. Having a separate assistant for this purpose prevents the stock of ligature and suture material from becoming fouled (i.e. infected) during an operation.

4. The theatre attendant keeps the theatre and surgical instruments clean; he helps to get the theatre ready before an operation, and makes himself generally useful during its progress.

Dental Department.—A very large number of cases are seen in this department, and the treatment of these patients is an important use of the hospital ship in its relation to the fleet.

A careful entry of every man seen is made in the out-patient register, with details of treatment. In addition, the dental surgeon makes all appointments, and adheres to them strictly in the order they are made. An appointment book is kept for the purpose.

X-ray Department.—When a case in the wards is sent to be *x*-rayed, a 'request' form (*Appendix XII*) from the surgeon stating the area to be radiographed accompanies the patient.

A full report is entered in the in-patient register in a special column for the purpose, or in the out-patient register, as the case may be.

Out-patient Department.—The following instruments for minor surgery are kept in this room:—

1 pair scissors
1 pair sinus forceps
1 scalpel
1 probe
1 clinical thermometer
6 needles, assorted
Horsehair and catgut.

It is in charge of the operating-theatre attendant. Should any of the wards require instruments and ligatures for a small operation, they obtain them from this department, and so avoid interference and the possible contamination of ligatures, etc., belonging to the operating theatre. A book is kept for entry of all patients treated, and the entries are copied into the out-patient register at the end of each day.

The Laboratory.—The urines of every case admitted are sent here for examination. Fixed to the urine glasses is a piece of paper, stating name, age, rating of patient, ward, and number of bed. The result of the examination is written on this piece of paper and returned with the empty glass to the ward, when this urine analysis is copied into the case notes by the surgeon. The steward of the ward is responsible for the cleaning of the glass. When a bacteriological or microscopical examination is required, a 'request form' from the surgeon stating the examination required accompanies the specimen. The same form is returned with the result of the examination (*Appendix XIV*).

The Examination Dark Room.—This room has proved very useful for the examination of eyes, ears, throat, and nose. On the bulkhead by the side of the lamp a small shelf is fitted, and is divided up to hold the various eye-drops required. The necessary instruments for the examination of eye, ear, and throat cases are kept in this room.

CHAPTER XI.

MISCELLANEOUS.

The Care of the Stores, Medical and Otherwise.—Experience showed that from time to time I received a bombshell that the stock of some important surgical store or drug was completely used up. This usually happened when the ship was at some place distant from a source of supply. Again, when the time arrived for renewing stores there was a tendency to order goods of which there was already an ample stock, and to omit ordering those really required. To avoid these disconcerting happenings, a simple system was devised for recording the expenditure and amount of stock of all stores. The system has proved a great help. A sick-berth reserve attendant (in civil life employed as a chargeman in a foundry) has been taught to take full charge of the general hospital stores, and does the work admirably.

All stores are registered by means of 'store register boards' (*Fig.* 17), measuring 10 in. × 26 in. There are four of these, as follows :—

1. Dispensary stores register
2. General hospital stores register
3. Operating-theatre stores register
4. Dental stores register.

The various articles are arranged in columns, and each column is divided up into fifteen squares. The top square gives the name of the article, below this is the unit of that article, and under this is a graduated scale of figures ranging from the complete amount stocked above to zero below. The present stock of the article is recorded by means of a Moore's push-pin. The question of a low-water mark of stock was carefully gone into ; the square which shows this figure is painted white to show the 'danger-mark,' and is an indication that a fresh supply must be ordered forthwith.

The advantages of this store-registering system are :—

a. Accurate demands are readily made out by deducting the amount remaining, as shown by the push-pin, from the total

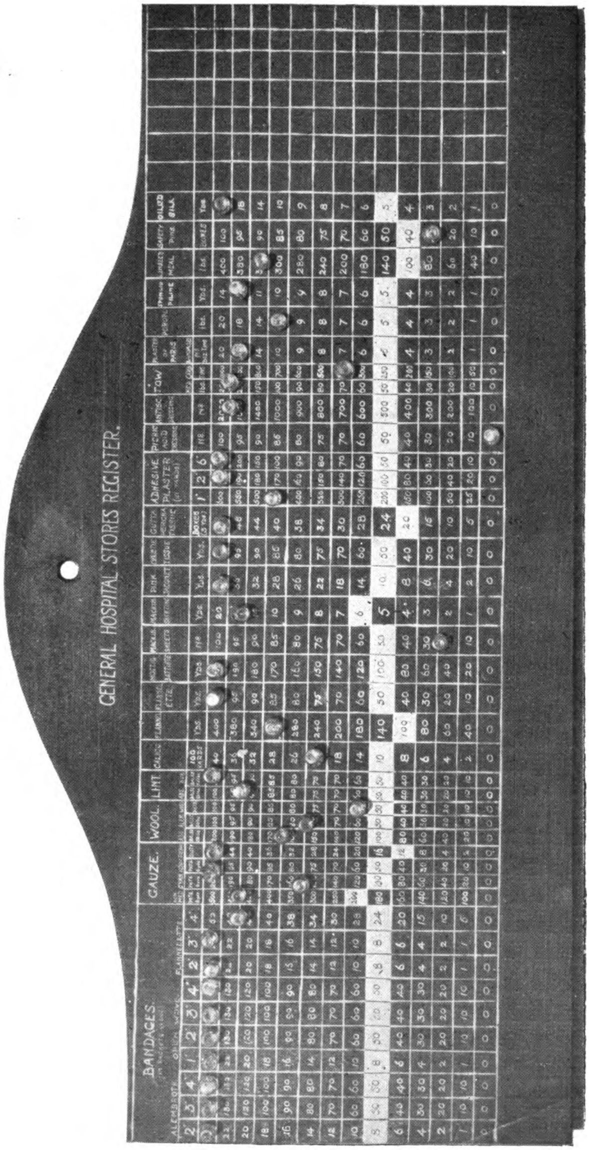


Fig. 17.—Store Register Board.

amount required; e.g., in the first column of the dispensary stores register there is a stock of 100 lb. of acid. carbol.: as our full stock is 150 lb., 50 lb. would be requisitioned for.

b. A large expenditure of any particular article is at once observed, and the necessary inquiries can be made as to the reason of it; thus any waste can be instantly checked. For example, I noticed that a large quantity of ol. terebinth. was being used, and on investigation it was found that wastage was taking place in the cleansing of the hands for operations and the dressing of cases. The institution of drop-bottles reduced the use of this article to a normal amount.

c. The white danger-line prevents important stores suddenly running short, perhaps in the middle of great pressure of work.

The boards are made out in duplicate: one is kept in the store-room, and is checked daily by the store-keeper; the other hangs in the senior medical officer's room, and is checked weekly.

The articles in each store-room are arranged exactly in the same order as shown on the store register boards, and are clearly marked (*Fig.* 18). This not only facilitates the checking of the amount of stock in hand, but in case of urgency and the absence of the store-keeper anyone can be sent to obtain any article without upsetting the whole place in finding it.

A store-room plainly labelled in this way is 'fool-proof.'

Ward Stores.—The ward-master issues to the steward of each ward the necessary amount of bedding, clothing, and utensils, with an inventory, and the steward of the ward is then responsible for them.

The ward stores are carefully checked after each complete disembarkation, and any discrepancy is at once reported and investigated. The surplus ward stores are kept in the main store, but a small quantity for immediate use is kept in the 'ready store.'

Surgical Dressings and Appliances.—Surgical dressings and appliances of every kind are kept in the 'ready' store, and are replenished when necessary from the main store. As previously mentioned, a reserve sick-berth attendant is in charge of the store-rooms. Nothing is allowed to be issued without a requisition signed by the senior medical officer in order to check issues and avoid waste. A stores book is kept for each ward, giving a complete record of everything which has been issued to that ward. Each ward is supplied with a large 'sister's cupboard' in which a store of dressings and appliances of every kind are

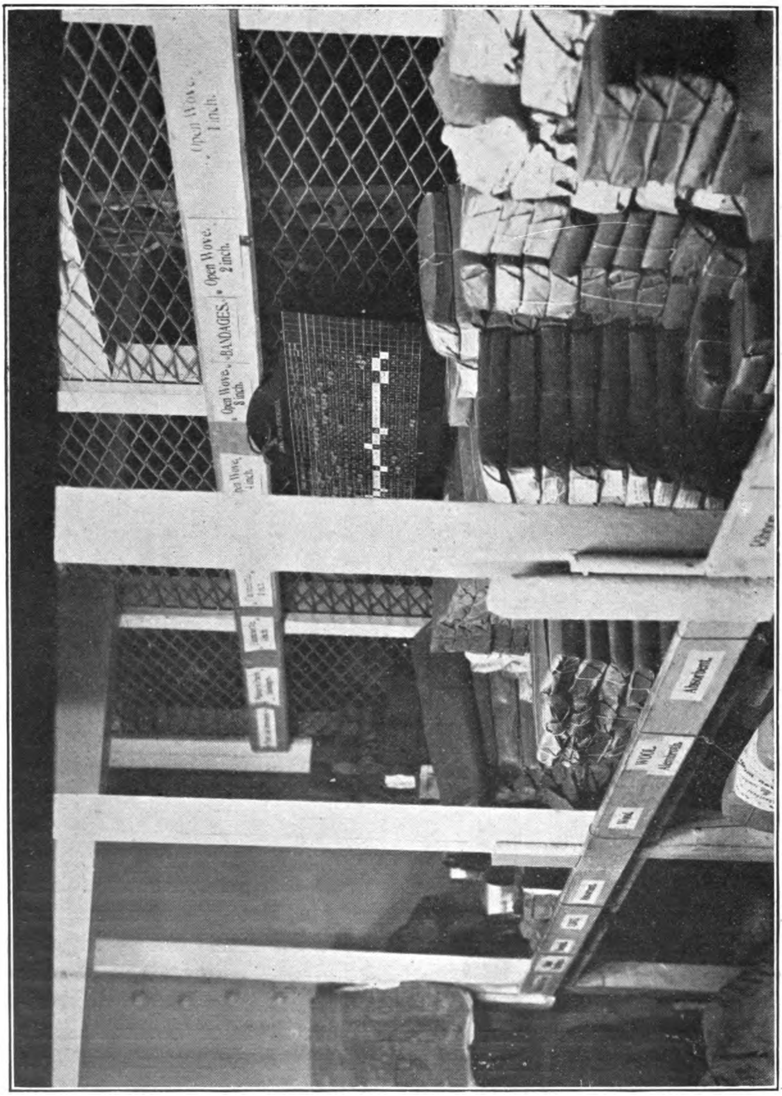


Fig. 18.—A Store-room, showing the articles arranged in exactly the same order as shown on its Store Register Board.

kept for immediate use and for an emergency. These are also replenished by requisition, and are under the charge of the nursing sister.

Surgical Instruments.—All surgical instruments are kept in the operating theatre, and are in charge of the operating theatre sick-berth steward. He is entirely responsible for their care and preservation, and is supplied with an inventory.

Splint Room.—A register of splints is kept similar to that of other stores. No splints are now kept in the wards, for in practice a tendency was found for splints to accumulate in one ward, and when the emergency came, delay arose in obtaining supplies for elsewhere. Again, it was not an easy matter, previously, to gauge the splints available.

Drugs.—Adjoining the dispensary is a large store-room used solely for drugs. The dispenser is answerable for them, and keeps an account of the amount used.

Mess Utensils.—These are supplied by the Company owning the ship, through the chief steward, as required. Each sick-berth steward in charge of a ward is given an inventory of articles supplied, and is responsible for them.

Cleaning Gear for Wards.—Also supplied by the Company.

Fire and Collision Stations.—The following is a copy of a printed notice issued by the Admiralty and prominently displayed in many parts of the ship :—

a. *First Alarm.*—Three blasts on the ship's whistle indicating "Close water-tight doors."
b. *Fire Alarm.*—The ship's bell will be rung violently; strokes in quick succession.
c. *Collision Alarm.*—The gong will be rung violently.
1. On the fire or collision alarm being sounded, the stewards and attendants of wards will close all scuttles and water-tight doors, if any.
2. Silence should be kept by everyone.
3. Patients able to assist will form stretcher-parties and, with the stewards and attendants of wards, bring helpless patients with their lifebelts to the upper deck, using lifts when possible.
4. Stewards and attendants of wards not on duty when the alarm is sounded will at once proceed to wards to which they are attached, taking their lifebelts with them, to assist in carrying out the above order.
5. A stretcher and canvas cot will be kept in each ward and placed in a convenient place ready for immediate use.
6. Ship's police, signalmen, ship's steward, assistant, and other naval ratings doing duty in hospital ship will at

once proceed to their stations and carry out the orders contained in their respective routines of duties.

7. The medical officers will repair to their respective wards and superintend the carrying out of the above orders.
8. At boat drill, sick-berth staff and naval ratings that can be spared will fall in for muster according to the boat they may be told off for.

N.B.—A drawing, showing position and number of ship's boats, with the list of the people to be carried, will be hung up in each ward, and should be consulted by all concerned.

All the staff are trained in man-handling.

The following method has been adopted, and would be largely used for bringing patients to the upper deck :—

A Method of Man-handling a Patient.—This is used in all ordinary cases which require man-handling. I consider it an excellent way of quickly, comfortably, and efficiently carrying a patient, and the sick-berth staff have all been instructed in the method. (See *Figs.* 19–21.)

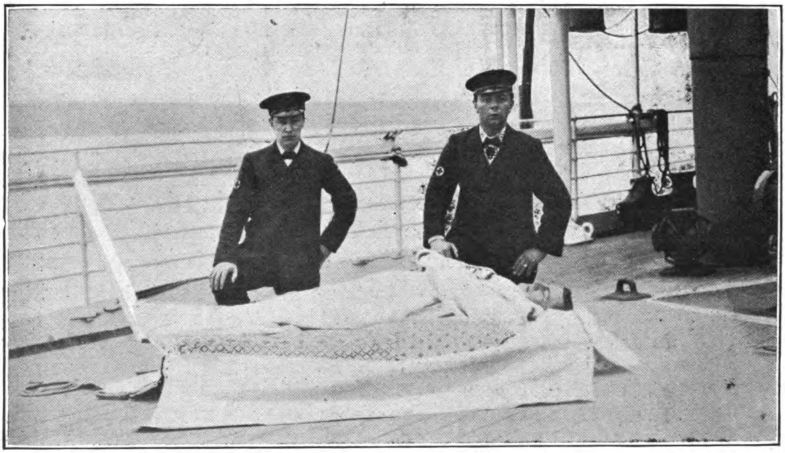


Fig. 19.—MAN-HANDLING—First Position.

Two attendants are required. They must stand on the right-hand side of the patient—one at the level of his shoulders, the other at the level of his buttocks. After crossing the patient's forearms over his chest, he is enveloped in a blanket ; one attendant then encircles the patient at the level of his scapulæ (upper part), his fingers of each hand being locked ; the other attendant grasps the patient's pelvis with his left arm, while his right arm holds both legs at the level of each popliteal space; or, if the patient is heavy, it is easier to lock the fingers of the

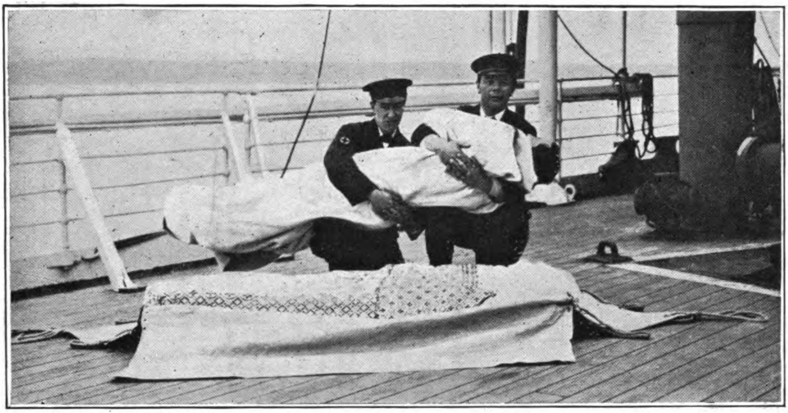


Fig. 20.—MAN-HANDLING—Second Position.

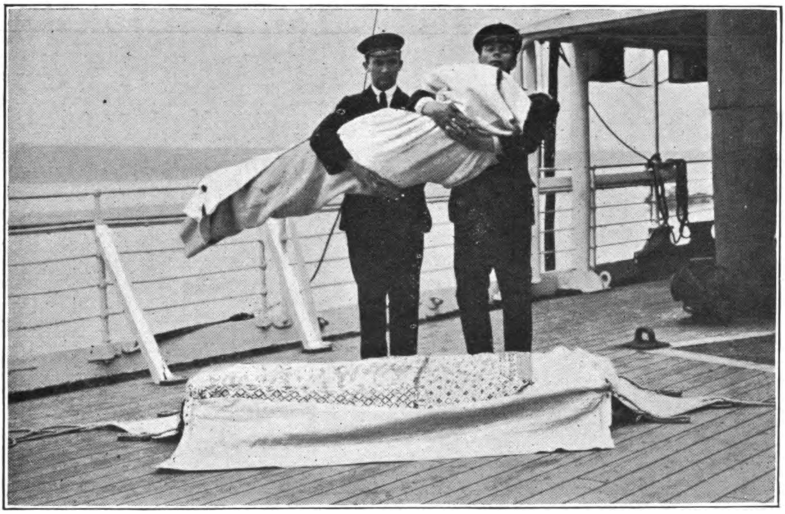
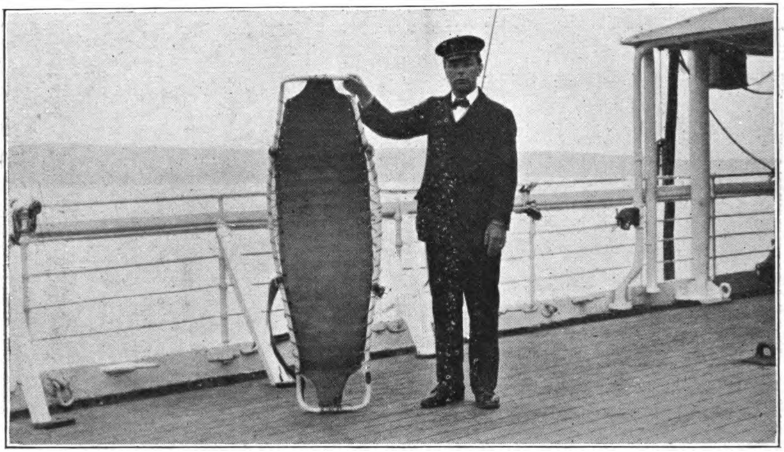


Fig. 21.—MAN-HANDLING—Third Position.

right hand with those of the left. The attendants bear the weight chiefly between their left arm and thorax. If the patient is conscious, he can assist greatly by holding himself stiff and by placing his arms round the attendant's neck.



Figs. 22, 23, 24.—LIGHT AND HANDY STRETCHER WITH ALUMINIUM FRAME —weight 10¼ lb.

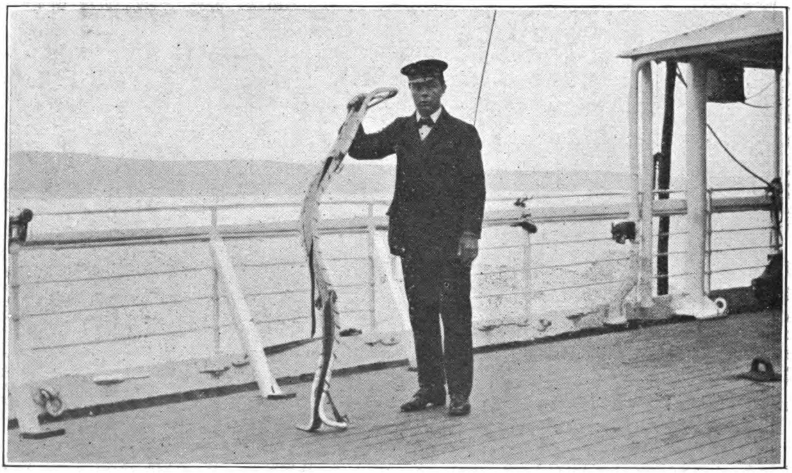


Fig. 23.

A Good Carrying Stretcher.—Should a rapid emptying of the wards become necessary on account of fire, etc., light and handy stretchers for the rapid removal of the sick are an important consideration. A good example is seen in *Fig.* 22. It consists of an aluminium frame on which is stretched a piece of canvas; the frame is bent to a comfortable reclining position of the body, and measures 6 ft. long by 13½ in. wide at each end, and 22 in. in the middle; weight 10¼ lb. Two straps are fitted for keeping the patient in position. This stretcher is very handy for use in a ship, where it may be necessary to get a patient up a narrow staircase or along narrow alleyways. It can be obtained from Messrs. Young, surgical instrument makers, Forest Road, Edinburgh.

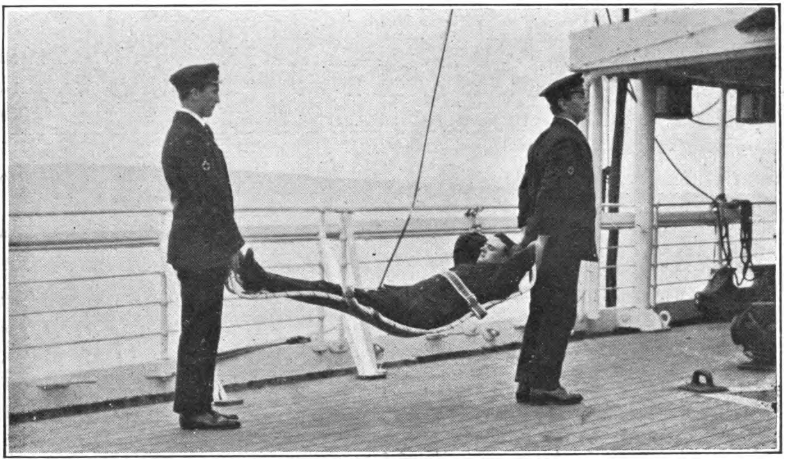


Fig. 24.

Arrangement for Allocation of Cots to any Wounded Enemy Prisoners.—The beds in the most prominent part of the ward have been allotted for this purpose, in order that they will be in full view of everybody should any tricks be attempted.

Disinfection of Clothes of Contacts in Fever Cases.—A very important function of the hospital ship in its relation to the fleet is its equipment for disinfection. The ordinary or non-infectious cases from the fleet are collected twice daily at 9 a.m. and 1.30 p.m., and brought to the hospital ship in a drifter (a steamboat used for fishing purposes which has been taken over temporarily by the Government for special duties), the hold of which is fitted for the accommodation of cots. A special drifter is set aside for infectious cases, and when this infectious boat has completed the duty for which she was detailed, she proceeds to the hospital ship with the working party for disinfection. The working party are instructed to bring a change of clothing, and the clothes they arrive in are placed in a disinfector; each man has a warm bath, and puts on clean clothing.

As the disinfection of the infectious boat and working party is a very frequent duty of the hospital ship, I would lay stress on the importance of having a disinfector in a convenient position near the gangway, aft, and in close proximity to a bathroom, easy of access. The boat is disinfected by the formalin spray and formanganate process.

The Fresh Water Problem.—In the Hospital Ship *Drina*, the average expenditure of fresh water when there were no patients, and therefore little laundry work, was 20 tons (4800 gallons) per diem. The maximum expenditure with patients on board, and laundry work, was 40 to 45 tons (9600 to 10,800 gallons) per diem.

It is thus seen that the output from the two distillers (8000 gallons) was not sufficient supply to meet the demand. The extra amount was supplied from water-boats. As the amount of fresh water acts also as ballast, it was important that the tanks should be kept as nearly full as possible. The laundry used 10 to 12 tons daily. In addition to this some amount of fresh water was lost owing to leakage, the maximum loss per diem in this respect being approximately 5 tons. When there are a large number of hot-water pipes passing through the ship to bathrooms, etc., leaking at joints is not uncommon, and constant supervision is required. The amount of storage space was 1029 tons in six tanks.

With regard to fresh-water expenditure, it must be remembered that the hospital ship differs from the ordinary ship or vessel in (1) The possession of a laundry, (2) Operating-room requirements, (3) The extra quantity required for personal ablutions, etc.

SECTION IV.

EMERGENCY ORGANIZATION ARRANGED FOR IN HOSPITAL SHIP 'DRINA.'

CHAPTER XII.

THE ADMISSION OF PATIENTS OVER AND ABOVE THE NORMAL COMPLEMENT OF 200.

Need for Preliminary Organization for an Emergency.—Under exceptional circumstances, such as the sudden arrival of a large party of wounded and shipwrecked men, we may be required to receive a number of patients far in excess of the complement of fixed cots (i.e., 224 in the 'Drina'). It is therefore not only necessary to be able to provide this additional accommodation, but also an organization for the admission of these patients.

If a number of extra patients should have to be received, they will probably arrive in large batches; without a pre-arranged organization for their admission there would certainly be chaos on their arrival; further, having received the extra patients, adequate arrangement must have been previously thought out for their receiving medical attention, for their nursing, and for their victualling.

How is this Extra Accommodation Obtainable?—In order to ascertain how many extra cases could be received, a careful survey of the ship was made. Although she contained large holds, it was found impossible to utilize them owing to the absence of ventilation, light, and convenient approach. By using the hatchways and alleyways of the wards, etc., there was space for 354 extra mattresses. Places were found in, and adjacent to, the wards, for 89 patients to sling their hammocks. In the various saloons of the ship were fixed chairs which would accommodate 283 patients with minor injuries, who can sit up.

Therefore the ship can take 950 patients in an emergency, distributed as follows :—

Fixed cots	224
Mattresses on the deck under cover	354
In hammocks	89
Sitting in fixed chairs	283
Total ..	950

Each emergency 'place' (i.e., mattress, hammock, or sitting) is duly numbered.

In every ward is a portable framed chart of the deck space of that ward, denoting numerically the site of each extra mattress (see copy of Notice below). The situation for the head end of each hammock is indicated by a painted **H** (followed by the number) at the allotted site.

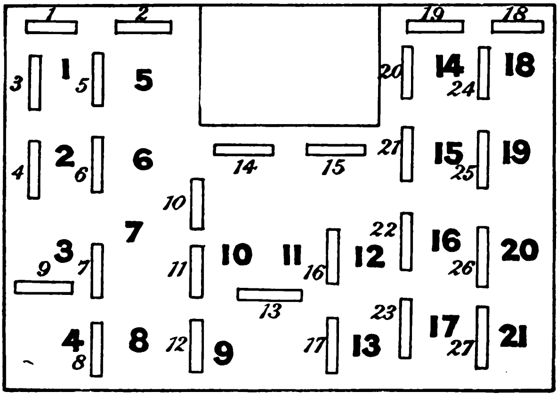


Fig. 25.—EMERGENCY MATTRESS ACCOMMODATION—E Ward.

The lighter figures denote position of emergency mattresses.

The patients will be admitted in the following order as far as possible :—

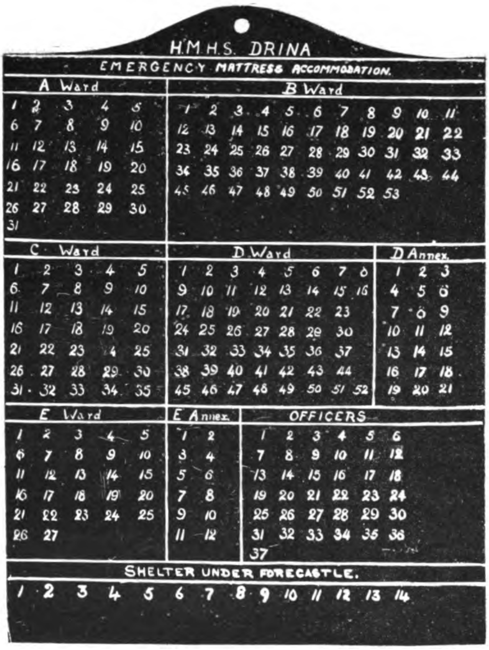
18
19
24
25
26
27
20
21
23
22
17
16
13
12
4
3
1
2
5
6
7
8
9
15
14
11
10

On the occasion arising, the position of each emergency mattress will be indicated by a label which will be nailed on to the floor *at the head end* of the site for each bed.

These labels are in the possession of the sick-berth steward of the ward, and must be personally fixed by him in their proper places on the floor immediately the emergency arises.

They, together with hammer and tacks (supplied for the purpose), will be kept in a box in the sister's cupboard.

Reception of Extra Patients.—As mentioned in the last sub-section, every place for emergency accommodation (lying down or sitting up) is numbered. Corresponding to every 'place' there are already made out in duplicate two identical linen labels, each being numbered. Each label has printed on it the variety of accommodation (i.e., mattress, hammock, or sitting), places for name, age, rating, ship, and disease, also whether that 'place' is on the port or starboard side of the ship ; the back is blank. One set of labels is kept in the admission department, while the duplicates are kept in the various wards.



H.M.H.S. DRINA

EMERGENCY MATTRESS ACCOMMODATION.

A Ward
1 2 3 4 5
6 7 8 9 10
11 12 13 14 15
16 17 18 19 20
21 22 23 24 25
26 27 28 29 30
31

B Ward
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41 42 43 44
45 46 47 48 49 50 51 52 53

C Ward
1 2 3 4 5
6 7 8 9 10
11 12 13 14 15
16 17 18 19 20
21 22 23 24 25
26 27 28 29 30
31 32 33 34 35

D Ward
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31 32 33 34 35 36 37
38 39 40 41 42 43 44
45 46 47 48 49 50 51 52

D Annex.
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21

E Ward
1 2 3 4 5
6 7 8 9 10
11 12 13 14 15
16 17 18 19 20
21 22 23 24 25
26 27

E Annex.
1 2
3 4
5 6
7 8
9 10
11 12

OFFICERS
1 2 3 4 5 6
7 8 9 10 11 12
13 14 15 16 17 18
19 20 21 22 23 24
25 26 27 28 29 30
31 32 33 34 35 36
37

SHELTER UNDER FORECASTLE.
1 2 3 4 5 6 7 8 9 10 11 12 13 14

Fig. 26.—REGISTRATION BOARD FOR EMERGENCY MATTRESS ACCOMMODATION.

On arrival of the patient on board, full particulars are obtained for the admission book ; a label denoting the accommodation allotted is attached to him ; the fact that this 'place' has been filled is recorded on the registration board (*Figs.* 26–28), and the patient is ready for despatch to the place. This label is kept affixed to the patient ; in a sudden great influx it will be impossible to write up the customary medical ticket, so the treatment

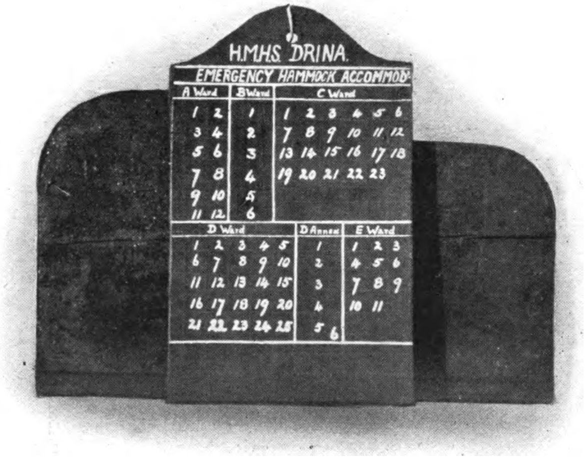


Fig. 27.—Registration Board for Emergency Hammock Accommodation.

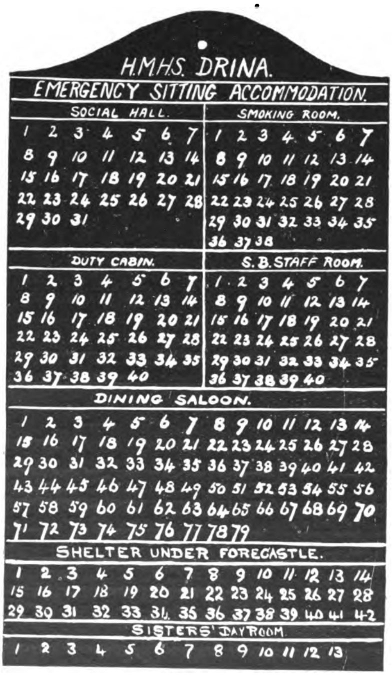


Fig. 28.—Registration Board for Emergency Sitting Accommodation.

given will be recorded on the back of the label for the information of those at the base hospital after he has been landed.

When it becomes necessary, the duplicate labels kept in the ward are fixed to the head of the site for each mattress space. To facilitate the quick storage of these extra patients, they are admitted in a definite order by the admission officer. By this means the most inaccessible places in each ward are first filled up.

Arrangements for Treating and Victualling the Extra Patients.—A medical and nursing staff designed to look after 224 patients obviously cannot give anything like adequate attention to 950 patients. Therefore a number much in excess of the ordinary complement of 224 cannot be kept on board for more than forty-eight hours. In other words, we should cease to be a *hospital ship* capable of adequately treating any kind of case, medical or surgical ; we should simply be able to carry out the functions of a *hospital carrier.*

For the medical, nursing, and administration purposes, each room, etc. (containing emergency sitting-up cases) is attached to a ward. Further, each such ‘ room ’ has definite lavatory accommodation allotted to it

Printed notices are ready, and will be posted up in prominent places, instructing the patients to look well after the label affixed to them, also ordering them not to wander about but to remain in the quarters allotted to them (*See Appendix XV*).

0.—3.

APPENDIX I.
(See page 45.)

ORDERS FOR THE DAY.

R.N.H.S. "DRINA." ____________191____

____

Duty Surgeon ____________________________________

Emergency Surgeons for Duty ______________________

____

Afternoon Duty Sister ______________________________

____

ROUTINE:

Post Box cleared at ____________________

Steamboat leaves ship at ____________________

„ „ shore on ____________________

____

P.M.O.

0—17

APPENDIX II.
(See page 61.)

ALPHABETICAL NOMINAL LIST.

R.N. HOSPITAL SHIP "DRINA." __________________191

____________Cases discharged to____________

NO.	NAME	RATING	SHIP	DISEASE	EFFECTS

M.—188.

APPENDIX III.
(See page 63.)

Case of a Patient Invalided, Dead, or sent to Hospital.

Name of Ship	No. on Ship's Books	Place where	Name of Patient	Age	Quality	Disease or Injury	Whither discharged	Date of Discharge	Date of Invaliding or Death

H.M.S.

at

the of 191

M.—190 (late 128) (Revised—November, 1907).

APPENDIX IV.
(See page 64.)

Official Number..........
Port Division............
Vaccinated, date and result
Re-vaccinated............

Division..............
Divisional Number ....
Company ....
Company Number.....

MEDICAL HISTORY SHEET FOR SEAMEN AND MARINES.

When entered ....
Where entered....
Date of Birth ....
Age at entry ....

CHRISTIAN NAME OR NAMES.

SURNAME.

Where Born..........
Previous Occupation ..
Seaman or Marine ....

Rating	Ship's Name, or Marine Division, &c.	No. on Ship's Books, or Divisional Number	Date of Admission on Sick List	Date of Discharge from Sick List	No. of Days Sick	Disease or Hurt	How disposed of	M.O.'s Initials	No. of Days in Hospital	If invalided, where? and when? If finally discharged, cause and date	Remarks

Note.—The information in the first three columns and in that headed "How disposed of," is to be inserted on board every Ship, &c., in which a man serves, whether he may have been on the Sick List or not. When a patient is received into Hospital the name of the Hospital is to be entered in the column of "Ship's Name, &c.," and all the entries in reference to his Disease, Discharge, &c., are to be inserted in *Red Ink*. The same course is to be adopted in the case of *Invalids* or *Men taking passage* on board ship, should they be placed on the Sick List. When a person is invalided at a Home Hospital the word *Invalided* is to be in large writing, to indicate that he is unfit for further Service, and that the Sheet is finally closed. When a man is sick on leave, the nature and period of the illness should be entered in this Sheet, with a note to show that the man was on leave. *Special attention is called to K.R. & A.I. Art.* 1306. In column for "Remarks" might be entered very briefly (1) nature and duration of special treatment for syphilis; (2) nature of operations (for hernia, etc.); (3) in case of injuries whether a Hurt Certificate was granted or not.

S.—47. (Revised—March 1914.)

APPENDIX V.
(See page 64.)

SICK VOUCHER.

TO ACCOMPANY MEN SENT TO HOSPITALS OR SICK QUARTERS.

The ______________ Persons undermentioned belonging to His Majesty's Ship ______________, of the ______________ Fleet or Station, requiring Hospital Treatment, have been sent to the ______________ at ______________ for that purpose, this ______________ day of ______________ 191 .

No. on S. B.	Port or Marine Division and Official or Regimental No.	NAMES	Rank or Rating	Disease or Hurt	Name and address of nearest Relative or Friend	Religious Denomination.	Amount of Allotment

Victualling adjusted to ______________ 191 , inclusive. (Article 1586 King's Regulations.)

To the ______________
of the Royal ______________
at ______________

______________ Captain.

______________ Surgeon.

Time of quitting the Ship ____ H. ____ M. Arrival at Hospital ____ H. ____ M.

______________ Officer who attended the Men.

A list of effects belonging to the undermentioned **Patients** sent to the **Establishment** named on the other side.

MEN DRESSED AS SEAMEN.

Names and Ratings	Kit Bag	No. 1 Jumper	Serge Jumpers	Serge Trousers	Uniform Jumpers	Working Jumpers	Duck Trousers	Canvas Overall Suit	Hat	Hat Cover	Caps, Cloth	Cap, Duck	Cap Cover	Cap Box	Cap Ribbons	Silk Handkerchiefs	Knife Lanyards	Knife	Comforter	Collars	Jersey	Flannels	Cholera Belts	Drawers	Socks or Stockings	Boots	Brushes	Hair Brush and Comb	Tooth Brush	Soap Bag	Towels	Ditty Box	Type	Clothes Stops	Bed Covers	Bed	Blanket	Hammocks	Clews, Lanyards and Lashing	OPTIONAL											Tobacco	Soap								Cash		
																																								W.P. Coat and Leggings	Sou' Wester	Check Shirts	Waist Belt	Overcoat	Mitts or Gloves	Shoes (Black)	Shoes (Brown Canvas)	Duck Bag, Small	Housewife	Razor or Scissors										£	s.	d.

MEN NOT DRESSED AS SEAMEN.

	Clothes Chest	Tool Chest	Kit Bag	Cloth Jacket	Serge Jackets	Duck Jackets	Drill Tunics	Cloth Waistcoat	Serge Waistcoat	Cloth Trousers	Serge Trousers	Duck Trousers	Cloth Caps	Cap Covers	Flannels	Drawers	Cholera Belts	White Shirts	White Collars	Check Shirts	Check Collars	Neckties (Silk)	Bows (Black Silk)	Braces	Socks or Stockings	Boots	Brushes	Hair Brush and Comb	Tooth Brush	Soap Bag	Towels	Ditty Box	Type	Clothes Stops	Aprons	Bed Covers	Bed	Blanket	Hammocks	Clews and Lashing	W.P. Coat and Leggings	Sou' Wester	Comforter	Mitts or Gloves	Overcoat	Overall Suit	Tartan Suit	Shoes (Black)	Shoes (Brown Canvas)	Razor or Scissors	Tobacco	Soap								Cash		
																																																												£	s.	d

Clothing Officer ____________________

Rank ____________________

S. 579.
Estabd. Feb. 1916.

APPENDIX VI.
(See page 64.)

HOSPITAL ENTRY AND DISCHARGE.

NOTE.—It is most important that this Form should accompany the Patient until arrival in Depot (b) or return to his Ship (c).

Ⓐ

(Name in full) ____________________
(Rating) ____________________ (Official Number) ____________
having been this day sent sick to (a) ____________________
has been borne for pay and victualling to ____________ inclusive.
Transfer List has been sent to H.M.S. (b) ____________________
H.M.S (c)
Date ____________ ____________ Accountant Officer.

Ⓑ

	PERIOD IN HOSPITAL OR HOSPITAL SHIP					
Naval, Military or Civil Hospital, or Hospital Ship	Received		Discharged		Whither sent	Signature of Principal Medical Officer
	Date	Time	Date	Time		

INSTRUCTIONS FOR THE USE OF THIS FORM.

H.M. SHIPS.—ON ALL OCCASIONS OF A MAN BEING SENT SICK the Certificate (A) is to be completed, the Hospital or Hospital Ship to which man is sent being shown at (a), and the Depot to which Transfer List is forwarded entered at (b).

If a man returns to his former ship the Depot should at once be informed, so that his account may be cancelled.

HOSPITALS AND HOSPITAL SHIPS.—A line of Certificate (B) should be filled in by each Hospital or Hospital Ship on receiving and discharging the Patient. On his arrival one of the slips overleaf should be completed, detached and forwarded to the Accountant Officer at the Depot named at (b) in Certificate (A).

Any requests for cash, or remittances to relatives, etc., should also be sent to the Depot with information of the address to which the money should be forwarded.

USE BOTTOM FORM FIRST.

(c) Name of Patient's original Ship (*vide* Certificate (A)).

(d) Name and Address of Naval, Military or Civil Hospital or Hospital Ship receiving Patient.

……

Name in full) ____________________

(Rating) ____________________ (Official Number) ____________

sent sick from H.M.S. (c) ____________________ has been received in

(d) ____________________

on (date) ____________________ at (time) ____________ .m.

____________________ Signature of Principal Medical Officer.

……

(Name in full) ____________________

(Rating) ____________________ (Official Number) ____________

sent sick from H.M.S. (c) ____________________ has been received in

(d) ____________________

on (date) ____________________ at (time) ____________ .m.

____________________ Signature of Principal Medical Officer.

……

(Name in full) ____________________

(Rating) ____________________ (Official Number) ____________

sent sick from H.M.S. (c) ____________________ has been received in

(d) ____________________

on (date) ____________________ at (time) ____________ .m.

____________________ Signature of Principal Medical Officer.

0-22.

APPENDIX VII.
(See page 64.)

DISCHARGE REPORT TO DEPÔT.

R.N. HOSPITAL SHIP "DRINA."

__________________________191

__________________________Depôt.

List of Patients discharged to ______________________
in accordance with A.W.O., No. 95, of 22nd January, 1915.

NAME	RANK	SHIP	DATE OF ADMISSION	DATE OF DISCHARGE	WHITHER

0—24.

APPENDIX VIII.
(See page 64.)

DISCHARGE REPORT TO SHIP.

From	*To*
SENIOR MEDICAL OFFICER,	COMMANDING OFFICER,
R.N. Hospital Ship "Drina."	H.M.S.

________________191

NAME	RATING	VICTUALLED FROM (Inclusive)

The above named______________discharged from R.N. Hospital Ship "Drina" to R.N. Hospital________ on________________

Victualled in "DRINA" from________to________inclusive.

Fleet Surgeon,
Senior Medical Officer.

0—21.

APPENDIX IX.
(See page 65.)

LIST OF MONEY AND VALUABLES BELONGING TO PATIENTS.

R.N. HOSPITAL SHIP "DRINA."

____________________ 191

NO.	NAME	RATING	SHIP	SUNDRIES.	MONEY

0—20.

APPENDIX X.
(See page 65.)

LIST OF CASES REQUIRING SPECIAL ATTENTION.

R.N. HOSPITAL SHIP "DRINA."

_______________ 191

NO.	NAME	RATING	SHIP	DISEASE

0—15.

APPENDIX XI.
(See page 69.)

STATEMENT OF PATIENTS IN ____________ WARD.

R.N. HOSPITAL SHIP "DRINA."

Duty or South	Cot or Non-Cot	No. of Cot	Diet F. or L.	Special Attention	Date of Discharge	Depot	Name	Age	Rating	Ship	Disease
S	C	16	L	Yes		Ports.	Jones, A.	17	O S	Violet	Pneumonia
D	N C	12	F	No	15/12/15	,,	Smith, C.	21	St'ker	Pansy	Tonsillitis

Appendix XI, i.e., that form which, as described in detail on p. 69, is kept fixed with drawing pins, in series of fours, on boards. Each form deals with the ward occupants belonging to one particular depôt, and which therefore gives, in a compact manner, the details which are required, in the not infrequent event of a hurried disembarkation of all patients belonging to that depôt—in the above instance Portsmouth.

O—7.

APPENDIX XII.
(See page 75.)

X RAY REPORT.

R.N. HOSPITAL SHIP "DRINA." ________________191

Name ________ Age ____ Rating ________ Ship ________

Please X Ray this Patient's ________________________

Diagnosis ________________________

________________________Surgeon.

REPORT ON SCREEN EXAMINATION:

REPORT ON PLATES:

Case No.__________ ________________________Surgeon.

……

O—10.

APPENDIX XIII.
(See page 74.)

OPERATION NOTICE.

R.N. HOSPITAL SHIP "DRINA." ________________191

An Operation will be performed upon

Name ________________________ Age ________

Rating ________________ Ship ________

in ____________ at ________ m. ________ 191

DISEASE ________________

OPERATION ________________

To the P.M.O. ________________ Surgeon.

O—8.

APPENDIX XIV.
(See page 76.)

LABORATORY REPORT.

R.N. HOSPITAL SHIP "DRINA." ________ 191

Name ________ Age ______ Rating ______ Ship ______

INVESTIGATION REQUIRED:

Diagnosis ________________________

________________ Surgeon.

REPORT:

Case No. ________ ________________ Surgeon.

APPENDIX XV.
(See page 91.)

NOTICE.

H.M.H.S. "DRINA."

Each Patient will be given a label on allotment of his quarters. It must be attached to his coat and must be carefully preserved until arrival at the shore Hospital. This label is to aid the distribution of Patients after leaving this Ship. Should it be lost the Patient cannot receive prompt attention. While on board the Patients must not leave their quarters without permission.

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